國立中山大學110學年度
碩士暨碩士專班招生考試試題

科目名稱：經濟學【企管系企管甲班碩士班甲組、乙組、丙組】

—作答注意事項—

考試時間：100分鐘

- **考試開始鈴響前不得翻閱試題，並不得書寫、劃記、作答。**請先檢查答案卷（卡）之應考證號碼、桌角號碼、應試科目是否正確，如有不同立即請監試人員處理。
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- **違規者依本校招生考試試場規則及違規處理辦法處理。**

國立中山大學110學年度碩士暨碩士專班招生考試試題

科目名稱：經濟學【企管系企管甲班碩士班甲組、乙組、丙組】 **題號：441001**

※本科目依簡章規定「不可以」使用計算機(混合題)

壹、單選題〈1至10題為中文題，每題4分；11題至18題為英文題，每題5分；總計80分〉

1. 下列何者總體變數是存量(stock)變數?
(A) 居住性投資支出 (residential investment)
(B) 全國儲蓄 (national saving)
(C) 政府移轉收入 (government transfer)
(D) 勞動投入(labor input)

2. 如果所有的產量都增加 5%，且所有的價格都下降 5%，那麼
(A)實質 GDP 增加 5%，而名目 GDP 不變
(B)實質 GDP 增加 5%，而名目 GDP 減少 5%
(C)實質 GDP 不變，而名目 GDP 增加 5%
(D)實質 GDP 不變，而名目 GDP 減少 5%

3. 對存款者(savor)而言，(當期)利率下降時，下列何者敘述正確？
(A) 因所得效果而當期消費增加
(B) 因所得效果而未來消費減少
(C) 因替代效果而當期消費減少
(D) 因替代效果而未來消費增加

4. 封閉經濟體系長期下，政府購買與定額稅等量增加使
(A) 民間儲蓄上升
(B) 全國儲蓄下降
(C) 公共儲蓄下降
(D) 公共儲蓄上升

5. 下列有關美國近 50 年來總體經濟成長典型事實(stylized facts on growth)之敘述何者不真？
(A)長期利率約為固定
(B)所得分配不均度(inequality)約為固定
(C)經濟成長與貿易量的成長高度相關
(D)勞動所得占 GDP 的份額約為固定

6. 停滯性通膨(stagflation)的成因為
(A) SRAS 往右移
(B) AD 往右移
(C) AD 往左移
(D) SRAS 往左移

7. 依泰勒原則(Taylor Principle)的 MP 曲線(monetary policy curve)的自發性部份(autonomous component)在遇到景氣過熱時會
(A)上升，且使 MP 與 AD 右移
(B)上升，且使 MP 與 AD 左移
(C)下降，且使 MP 與 AD 右移
(D)下降，且使 MP 與 AD 左移。

8. 對一封閉經濟體系而言，下列何者模型增加政府購買 1000 億的政策排擠效果最大？
(A) IS-LM model
(B)具有正斜率短期總合供給曲線的 AD-AS model
(C)具有水準短期總合供給曲線的 AD-AS model
(D) Keynesian-Cross model

9. 當經濟陷入衰退時，下列何者是自動穩定因子(automatic stabilizers)的例子?
(A)股價下跌
(B)政府提出振興經濟計劃
(C)更多人領取失業保險給付
(D)央行增加貨幣供給

10. 若美國等大型開放經濟體系實施擴張性財政政策，將使臺灣等小型開放經濟體系之經常帳餘
(A)上升
(B)不變
(C)下降
(D)題意資訊不足，無從判斷

11. Most of the electricity in China comes from coal, which accounted for 65% of the electricity generation mix in 2019. In 2019, China imported around 300 million tons of coal from Australia. In 2020, Chinese government imposed import restrictions targeting Australia's coal. Who would be hurt by these policies?
    a. Coal miners in China
    b. Coal miners in Russia
    c. Electricity consumers in India
    d. Electricity consumers in China

12. Assume that two countries A and C can produce both timber and cars. The country A can produce 20 units of timber or 8 units of cars in one week; the country C can produce 15 units of timber or 4 units of cars in one week. If A and C trade to each other, **for the country A**, what is the possible terms of trade?
    a. 4
    b. 3
    c. 0.4
    d. 0.33

13. In the clothes market of Bangladesh, all clothes producers are price-takers. These clothes producers make tons of water pollution. Assume that the Bangladesh government decides to impose a one-time tax to each clothes producer in 2021; the payment for each producer depends on their production in 2019. In the short run, what will happen to the equilibrium price and quantity of the clothes market in Bangladesh after this policy?
    a. The equilibrium quantity and price will both decrease.
    b. The equilibrium quantity will decrease, but the equilibrium price will increase.
    c. The equilibrium quantity will decrease, but the equilibrium price will be uncertain.
    d. The equilibrium quantity and price will not change.

14. In the cabbage market of Taiwan, most cabbage sellers are price-takers. In this month, assume that in the equilibrium, the demand has an own-price elasticity of -1.5, and the supply has a price elasticity of 0.75. Suppose a per-unit tax of NT3, to be collected from sellers, is imposed in the market in this month. For the tax of NT3, which answer below is the possible amount of tax that will be shifted to the buyers?
    a. 2
    b. 1.5
    c. 1
    d. 0

15. Which of the following statements is **correct** regarding profit-maximizing firms in the long run?
    a. In perfect competition, firms produce an output at which price is less than marginal cost.
    b. In perfect competition, firms produce an output at which price is greater than marginal cost.
    c. In monopolistic competition, firms produce less than the output at which average total cost is minimized.
    d. In monopolistic competition, firms produce more than the output at which average total cost is minimized.

16. Suppose that there is a global market of X. In the country T, the producers for X are price-takers, and there is no domestic consumers; they export all X they produce. The international price for X is \$50 per unit. The private total cost function for a firm in T to produce X is $400+0.01Q^2$, where Q is the units of X the firm produces. Recently, the government finds that producing X also causes external costs, which are around \$10 per unit. Which policy below can correct this market failure, and achieve the social optimum in the country T?
    a. The government can impose a per-unit tax of \$5 on producers in T.
    b. The government can request each producer in T to reduce their production by 500 units.
    c. The government can set 1000 units as an upper bound on the production of each producer.
    d. The government can request each producer to export at least 500 units.

17. U is a monopoly producer for a special device; yet, they do not have a sales department. In a small town K, there are two retailers, D1 and D2, selling this device. U proposes a take-it-or-leave-it offer for D1 and D2; then, D1 and D2 engage in **Bertrand price competition**. The total demand in this town for the special device is $Q(P) = 1000-5P$. The average variable cost for U to produce this device is 45. While selling devices, D1 and D2 will not incur additional cost. No fixed cost for U, D1 and D2. The retailing price or the wholesale price can be **only an integer**. What is the possble retailing price in which D1 sells this special device?
    a. 46
    b. 92
    c. 123
    d. 161

18. Refer to Problem 17. Now, assume that U acquires D1; that is, U and D1 become one company. U still proposes a take-it-or-leave-it offer for D2; then, D1 (or U) and D2 engage in **Bertrand price competition** in the retailing market. Other conditions remain the same. Under this setup, which statement below is **wrong**?
    a. D2 cannot earn a profit bigger than zero in all equilibria.
    b. D2 cannot sell any device in all equilibria.
    c. The retailing price set by D1 can be higher than the retailing price set by D2 in an equilibrium.
    d. The retailing price set by D1 can equal the retailing price in Problem 17 in an equilibrium.

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貳、填充題〈每小格5分, 共10分; 只需填寫答案〉

1. 有一封閉經濟體系，產品市場均衡式為$Y = 1700 - 100r$，貨幣市場均衡式為$M/P = Y - 100r$，其中Y、r、M、P分別為總合產出、利率、貨幣供給、與一般物價水準，則 AD 曲線方程式為__(1)__。若$M = 1000$，$P = 10$，則總合產出為__(2)__ 。

參、計算申論題〈共計10分；請簡附計算或推導過程〉

1. **(10 pts)** A與B正在競標一件古物。賣方以**次價密封拍賣法 (second-price sealed-bid auction)** 進行拍賣：A 和 B 先各自同時將自己的願付價格寫在標單上，再密封於信封中交給賣家；賣家開封後以出價最高者得標，得標者再以**出價次高者寫在標單上的價格買下該件古物**。若兩人出價皆同時，則抽籤決定誰得標；兩人皆有 1/2 的機率贏得購買權。在標單上寫下的價格只能以萬元為單位；出價的範圍只能在 1 萬到 5 萬之間。設若 A 取得該古物後，A 會獲得相當於 4 萬元的效用；而該古物對 B 的效用則為 3 萬元。A與B兩人皆知該古物對雙方的價值 (或效用) 為何。
   a. 請寫下 A、B 在此拍賣中該如何出價的標準型賽局 (normal form game)。(5 pts)
   b. 請找出此賽局中所有單純策略的納許均衡 (pure strategy Nash equilibria)。(3 pts)
   c. 請由你在前一小題中所找出的納許均衡裡，挑出構成均衡的兩策略皆不為劣勢策略的納許均衡。(2 pts)

國立中山大學110學年度
碩士暨碩士專班招生考試試題

科目名稱：商用統計學【企管系企管甲班碩士班甲組選考、乙組選考、丙組選考】

－作答注意事項－

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國立中山大學110學年度碩士暨碩士專班招生考試試題

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※本科目依簡章規定「可以」使用計算機（廠牌、功能不拘）（混合題）　　共8頁第1頁

一、複選題(共18題，每題五分，合計90分)
Use the tables of probability distributions in Appendix as needed (page 5-8).

1. Which of the following is/are included in the field of statistics? (A) Collecting data; (B) Analyzing data; (C) Presenting data; (D) Interpreting data; (E) None of above.

2. Which of the following descriptions is/are INCORRECT? (A) "Phone number" is a nominal variable; (B) "Temperature in Celsius" is a ratio variable; (C) "Cancer stage" is an interval variable; (D) "Height in centimeter" is a discrete variable; (E) "Age group" is a categorical variable.

3. Which of the following is/are NOT used to measure central location? (A) Arithmetic mean; (B) Interquartile range; (C) Mode; (D) Standard deviation; (E) Midrange.

4. Which of the following is/are correct? (A) A "scatterplot" is good for obtaining the potential association between two numerical variables; (B) Unlike "bar graph", a "histogram" has no natural separation between rectangles of adjacent classes; (C) A "pie chart" is good for comparing the means of a numerical variable between two independent groups; (D) In a "Box-plot", the line drawn in the box indicates the location of the mean; (E) "100% stacked area chart" can be used to compare the change in distribution of a categorical variable over a period of time.

5. If two events X and Y are independent, which of the following conditions is/are satisfied? (A) $P(Y|X)=P(Y)$; (B) $P(Y|X)=P(X)$; (C) $P(A\cap B)=P(A)+P(B)$; (D) $P(A\cup B)=P(A)\cdot P(B)$; (E) None of above.

6. Assume the following conditions in Taiwan: 10% of undergraduate students study abroad as part of their education. 60% of the undergraduate students who study abroad are female and 50% of the undergraduate students who do not study abroad are female. Which of the following is/are correct: (A) Given a female undergraduate student, the probability that she studies abroad is 11.76%; (B) The overall percentage of female undergraduate students is 51%; (C) The overall percentage of male undergraduate students is 50%; (D) Given a male undergraduate student, the probability that he studies abroad is 4%; (E) Given the undergraduate students who study abroad, the probability of male is 8.16%.

7. Which of the following belongs to continuous probability distributions? (A) Normal probability distribution; (B) Poisson probability distribution; (C) Binomial probability distribution; (D) Exponential probability distribution; (E) Chi-square probability distribution.

8. Let P[Y=x] indicate the probability of a sum of x when rolling three dice. Which of the following is/are correct? (A) P[Y=18]=1/216; (B) P[Y=17]=3/216; (C) P[Y=1]=1/216; (D) P[Y=3]=3/216; (E) P[Y<5]=4/216.

9. Cars arrive at a car wash service randomly and independently. The probability of an arrival is the same for any interval of equal length. The mean arrival rate is 4 cars per 10 minutes. Which of the following is/are correct? (A) The probability that less than 2 cars will arrive during any given 10 minutes of operation is 0.0916; (B) The probability that 5 or more cars will arrive during any given 10 minutes of operation is 0.7815; (C) The probability that more than 6 cars will arrive during any given 10 minutes of operation is 0.1107; (D) The probability that exact 9 cars will arrive during any given 10 minutes of operation is 0.0550; (E) The variance of the arrival rate per 10 minutes is 4.

10. Suppose that the mean daily TV viewing time per household follows a normal distribution with a mean of 5 hours and a standard deviation of 2 hours. Which of the following is/are correct? (A) The probability that a household views TV more than 3 hours a day is 0.1587; (B) The probability that a household views TV between 4-7 hours a day is 0.5328; (C) In order to be in the bottom 10% of all TV viewing households, a household has to view TV for less than 2.44 hours a day; (D) Among a group of households that all members are obese (BMI>=35), we randomly selected a sample of 16 households to investigate whether the mean of their TV viewing time is longer than that of the population mean. We found that the sample mean was 6.5 hours. To conduct a one-tailed z-test with α=0.05, the z-score=3. (E) From (D), we can conclude that households with all obese members have longer TV viewing time than the population with the p-value=0.0013, based on the one-tailed z-test.

11. Rejecting a null hypothesis when the null hypothesis is false is called: (A) Type I error; (B) Type II error; (C) Type III error; (D) power; (E) confidence limit.

12. In which occasions can we apply a Chi-square test for statistical testing? (A) Test the association between two categorical variables; (B) Test for goodness of fit; (C) Test whether a sample variance is different from the population variance; (D) Test whether sample variances from two groups are different; (E) Test whether sample means from three groups are different.

13. Consider the following hypothesis test: H_0: μ=18; H_a: $\mu\neq$18. A sample of 36 provided a sample mean of 17 and a sample standard deviation of 3. Which of the following is/are correct? (A) The computed test statistic is -2; (B) The degree of freedom is 17; (C) The p-value <0.05; (D) At α=0.05, the critical values are ±1.96 for the statistical testing; (E) At α=0.05, do not reject the null hypothesis.

14. Which of the following is/are NOT correct about ANOVA? (A) One assumption of ANOVA is that all samples are drawn independently; (B) One assumption of ANOVA is that the variances of the populations are equal; (C) Suppose four groups are compared, the null hypothesis is $\mu1= \mu2= \mu3 = \mu4$, while the alternative hypothesis is $\mu1\neq \mu2\neq \mu3 \neq \mu4$; (D) One-way ANOVA is a one-tailed test, while two-way ANOVA is a two-tailed test; (E) If the test result is not to reject the null hypothesis, we must perform a post-hoc test to confirm that these groups are truly no different from each other.

15. Suppose you got data of "Hight in centimeter" and "Weight in kilogram" from all students in an elementary school and you want to investigate the association between the height and weight. Which of the following is/are NOT appropriate? (A) Conduct a line chart to visualize their association; (B) Estimate a correlation coefficient, which ranges from -1 to +1; (C) Conduct a t-test to compare whether height and weight are statistically different; (D) Develop a simple linear regression model and detect whether the slope is significantly different from 0; (E) Estimate the coefficient of determination from the simple linear regression model.

16. A survey was conducted among mid-sized and small-sized enterprises in Taiwan to investigate their employment plan ("Add Employees", "No Change", or "Lay-off Employee") in Year 2021. The table below summarizes the observed result and its expected value (in the parenthesis) for each cell:

	Mid-size	Small-size	Total
Add Employees	10(?)	30(?)	40
No Change	20(15)	10(?)	30
Lay-off Employees	20(?)	10(15)	30
Total	50	50	100

Which of the following is/are correct? (A) The expected value of mid-sized companies responding to "Add Employees" is 20; (B) The degree of freedom is 6; (C) The Chi-squared statistic is 16.67; (D) The p-value<0.001; (E) Given α=0.05, we conclude that there is an association between the size of company and its employment plan.

17. Which of the following descriptions is/are correct about forecasting? (A) A Naïve forecasting method is done without considering any historical data; (B) When a positive trend exists, the forecasting using moving average method tends to underestimate the true values. (C) In a simple exponential smoothing method, a higher smoothing factor increases the level of smoothing, making the forecast less responsive to recent changes. (D) By treating time as the independent variable and the time series as a dependent variable, regression analysis can be used as a time series method. (E) Time series decomposition can be used to separate or decompose a time series into seasonal, trend, and irregular (error) components.

18. A survey with size of 150 was conducted to investigate whether gender (male versus female) is associated with annual salary (the dependent variable), after controlling for years of experience, years of education, and the position level categorized as "top or middle level manager", "first-line manager", and "non-manager". You want to conduct a multiple linear regression model. Which of the following is/are correct? (A) When testing for the overall significance of the model, the degree of freedom for the critical value of F is (6, 143); (B) Assuming that we treat "male" as a reference group for the gender variable, the estimated coefficient is interpreted as the additional amount of women's annual salary compared with male's, after years of experiences, years of education, and the position level are held constant; (C) To test whether years of education is significant factor on annual salary after adjusting other variables, we can use t-test with a degree of freedom of 144 to detect whether its estimated coefficient is different from 0; (D) Given that the 95% confidence interval of the coefficient for years of experience is (500, 1000), its estimated coefficient is definitely a positive value; (E) The variable of "position level" has to be converted to a numerical variable by assigning "non-manager" as 0, "first-line manager" as 1, and "top or middle level manager" as 2 in order to be included in the regression model.

二、簡答題 (一大題五個子題，每子題兩分，合計 10 分)

To test for any difference in the number of hours between breakdowns for three machines, 5 observations for each machine were collected randomly. The ANOVA was conducted, and the result from the Excel Output is listed below. Please fill the blanks on the answer sheet.

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	9.36	?	① .	③ .	?	④ .
Within Groups	12.48	?	② .			
Total	?	?				

1. What is the value of ①?
2. What is the value of ②?
3. What is the value of ③?
4. What is the value of ④ (the critical value for statistical testing)?
5. Based on the information above, is there a statistical difference in hours between breakdowns among three machines at α=0.05? (Please answer "yes", "no", or "not enough information")

Appendix:

Poisson Cumulative Distribution*

λ=	1	2	3	4	5	6	7	8	9
x=									
0	0.3679	0.1353	0.0498	0.0183	0.0067	0.0025	0.0009	0.0003	0.0001
1	0.7358	0.4060	0.1991	0.0916	0.0404	0.0174	0.0073	0.0030	0.0012
2	0.9197	0.6767	0.4232	0.2381	0.1247	0.0620	0.0296	0.0138	0.0062
3	0.9810	0.8571	0.6472	0.4335	0.2650	0.1512	0.0818	0.0424	0.0212
4	0.9963	0.9473	0.8153	0.6288	0.4405	0.2851	0.1730	0.0996	0.0550
5	0.9994	0.9834	0.9161	0.7851	0.6160	0.4457	0.3007	0.1912	0.1157
6	0.9999	0.9955	0.9665	0.8893	0.7622	0.6063	0.4497	0.3134	0.2068
7	1.0000	0.9989	0.9881	0.9489	0.8666	0.7440	0.5987	0.4530	0.3239
8	1.0000	0.9998	0.9962	0.9786	0.9319	0.8472	0.7291	0.5925	0.4557
9	1.0000	1.0000	0.9989	0.9919	0.9682	0.9161	0.8305	0.7166	0.5874

* The table gives the probability of that a Poisson random variable X with mean= λ is less than or equal to *x*. That is, the table gives $P(X \leq x) = \sum_{r=0}^{x} \frac{e^{-\lambda}\lambda^{r}}{r!}$

國立中山大學110學年度碩士暨碩士專班招生考試試題

科目名稱：商用統計學【企管系企管甲班碩士班甲組選考、乙組選考、丙組選考】題號：441002

※本科目依簡章規定「可以」使用計算機（廠牌、功能不拘）（混合題）　　

Left-Tailed Cumulative Standard Normal Probability Distribution (Z)*

z	0	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
-3.0	0.0013	0.0013	0.0013	0.0012	0.0012	0.0011	0.0011	0.0011	0.0010	0.0010
-2.9	0.0019	0.0018	0.0018	0.0017	0.0016	0.0016	0.0015	0.0015	0.0014	0.0014
-2.8	0.0026	0.0025	0.0024	0.0023	0.0023	0.0022	0.0021	0.0021	0.0020	0.0019
-2.7	0.0035	0.0034	0.0033	0.0032	0.0031	0.0030	0.0029	0.0028	0.0027	0.0026
-2.6	0.0047	0.0045	0.0044	0.0043	0.0041	0.0040	0.0039	0.0038	0.0037	0.0036
-2.5	0.0062	0.0060	0.0059	0.0057	0.0055	0.0054	0.0052	0.0051	0.0049	0.0048
-2.4	0.0082	0.0080	0.0078	0.0075	0.0073	0.0071	0.0069	0.0068	0.0066	0.0064
-2.3	0.0107	0.0104	0.0102	0.0099	0.0096	0.0094	0.0091	0.0089	0.0087	0.0084
-2.2	0.0139	0.0136	0.0132	0.0129	0.0125	0.0122	0.0119	0.0116	0.0113	0.0110
-2.1	0.0179	0.0174	0.0170	0.0166	0.0162	0.0158	0.0154	0.0150	0.0146	0.0143
-2.0	0.0228	0.0222	0.0217	0.0212	0.0207	0.0202	0.0197	0.0192	0.0188	0.0183
-1.9	0.0287	0.0281	0.0274	0.0268	0.0262	0.0256	0.0250	0.0244	0.0239	0.0233
-1.8	0.0359	0.0351	0.0344	0.0336	0.0329	0.0322	0.0314	0.0307	0.0301	0.0294
-1.7	0.0446	0.0436	0.0427	0.0418	0.0409	0.0401	0.0392	0.0384	0.0375	0.0367
-1.6	0.0548	0.0537	0.0526	0.0516	0.0505	0.0495	0.0485	0.0475	0.0465	0.0455
-1.5	0.0668	0.0655	0.0643	0.0630	0.0618	0.0606	0.0594	0.0582	0.0571	0.0559
-1.4	0.0808	0.0793	0.0778	0.0764	0.0749	0.0735	0.0721	0.0708	0.0694	0.0681
-1.3	0.0968	0.0951	0.0934	0.0918	0.0901	0.0885	0.0869	0.0853	0.0838	0.0823
-1.2	0.1151	0.1131	0.1112	0.1093	0.1075	0.1056	0.1038	0.1020	0.1003	0.0985
-1.1	0.1357	0.1335	0.1314	0.1292	0.1271	0.1251	0.1230	0.1210	0.1190	0.1170
-1.0	0.1587	0.1562	0.1539	0.1515	0.1492	0.1469	0.1446	0.1423	0.1401	0.1379
-0.9	0.1841	0.1814	0.1788	0.1762	0.1736	0.1711	0.1685	0.1660	0.1635	0.1611
-0.8	0.2119	0.2090	0.2061	0.2033	0.2005	0.1977	0.1949	0.1922	0.1894	0.1867
-0.7	0.2420	0.2389	0.2358	0.2327	0.2296	0.2266	0.2236	0.2206	0.2177	0.2148
-0.6	0.2743	0.2709	0.2676	0.2643	0.2611	0.2578	0.2546	0.2514	0.2483	0.2451
-0.5	0.3085	0.3050	0.3015	0.2981	0.2946	0.2912	0.2877	0.2843	0.2810	0.2776
-0.4	0.3446	0.3409	0.3372	0.3336	0.3300	0.3264	0.3228	0.3192	0.3156	0.3121
-0.3	0.3821	0.3783	0.3745	0.3707	0.3669	0.3632	0.3594	0.3557	0.3520	0.3483
-0.2	0.4207	0.4168	0.4129	0.4090	0.4052	0.4013	0.3974	0.3936	0.3897	0.3859
-0.1	0.4602	0.4562	0.4522	0.4483	0.4443	0.4404	0.4364	0.4325	0.4286	0.4247
-0.0	0.5000	0.4960	0.4920	0.4880	0.4840	0.4801	0.4761	0.4721	0.4681	0.4641

* The probabilities given in this table represent the area to the left of the z-score.

Right-tailed Cumulative Student's t Distribution

α=	0.1	0.05	0.025	0.01	0.005	0.001
df=						
5	1.4759	2.0150	2.5706	3.3649	4.0321	5.8934
6	1.4398	1.9432	2.4469	3.1427	3.7074	5.2076
7	1.4149	1.8946	2.3646	2.9980	3.4995	4.7853
8	1.3968	1.8595	2.3060	2.8965	3.3554	4.5008
9	1.3830	1.8331	2.2622	2.8214	3.2498	4.2968
10	1.3722	1.8125	2.2281	2.7638	3.1693	4.1437
11	1.3634	1.7959	2.2010	2.7181	3.1058	4.0247
12	1.3562	1.7823	2.1788	2.6810	3.0545	3.9296
13	1.3502	1.7709	2.1604	2.6503	3.0123	3.8520
14	1.3450	1.7613	2.1448	2.6245	2.9768	3.7874
15	1.3406	1.7531	2.1314	2.6025	2.9467	3.7328
16	1.3368	1.7459	2.1199	2.5835	2.9208	3.6862
17	1.3334	1.7396	2.1098	2.5669	2.8982	3.6458
18	1.3304	1.7341	2.1009	2.5524	2.8784	3.6105
19	1.3277	1.7291	2.0930	2.5395	2.8609	3.5794
20	1.3253	1.7247	2.0860	2.5280	2.8453	3.5518
21	1.3232	1.7207	2.0796	2.5176	2.8314	3.5272
22	1.3212	1.7171	2.0739	2.5083	2.8188	3.5050
23	1.3195	1.7139	2.0687	2.4999	2.8073	3.4850
24	1.3178	1.7109	2.0639	2.4922	2.7969	3.4668
25	1.3163	1.7081	2.0595	2.4851	2.7874	3.4502
26	1.3150	1.7056	2.0555	2.4786	2.7787	3.4350
27	1.3137	1.7033	2.0518	2.4727	2.7707	3.4210
28	1.3125	1.7011	2.0484	2.4671	2.7633	3.4082
29	1.3114	1.6991	2.0452	2.4620	2.7564	3.3962
30	1.3104	1.6973	2.0423	2.4573	2.7500	3.3852
31	1.3095	1.6955	2.0395	2.4528	2.7440	3.3749
32	1.3086	1.6939	2.0369	2.4487	2.7385	3.3653
33	1.3077	1.6924	2.0345	2.4448	2.7333	3.3563
34	1.3070	1.6909	2.0322	2.4411	2.7284	3.3479
35	1.3062	1.6896	2.0301	2.4377	2.7238	3.3400

The table gives the value of t(α;df) where Pr(T(df)>t(α;df))=α with df degree of freedom.

Cumulative Chi-square Probability Distribution (Upper-Tail Areas)*

p=	0.1	0.05	0.025	0.01	0.001
df=					
1	2.7055	3.8415	5.0239	6.6349	10.8276
2	4.6052	5.9915	7.3778	9.2103	13.8155
3	6.2514	7.8147	9.3484	11.3449	16.2662
4	7.7794	9.4877	11.1433	13.2767	18.4668
5	9.2364	11.0705	12.8325	15.0863	20.5150
6	10.6446	12.5916	14.4494	16.8119	22.4577
7	12.0170	14.0671	16.0128	18.4753	24.3219
8	13.3616	15.5073	17.5345	20.0902	26.1245
9	14.6837	16.9190	19.0228	21.6660	27.8772
10	15.9872	18.3070	20.4832	23.2093	29.5883

The table shows the Chi-square values given the probability (p) as upper-tail area at the degree of freedom of 'df'.

The Critical values for F-distributions at (df1, df2) degree of freedom, given alpha=0.05

		Numerator degrees of freedom(df1)									
		1	2	3	4	5	6	7	8	9	10
Denominator degrees of freedom (df2)	1	161.45	199.50	215.71	224.58	230.16	233.99	236.77	238.88	240.54	241.88
	2	18.513	19.000	19.164	19.247	19.296	19.330	19.353	19.371	19.385	19.396
	3	10.128	9.5521	9.2766	9.1172	9.0135	8.9406	8.8867	8.8452	8.8123	8.7855
	4	7.7086	6.9443	6.5914	6.3882	6.2561	6.1631	6.0942	6.0410	5.9988	5.9644
	5	6.6079	5.7861	5.4095	5.1922	5.0503	4.9503	4.8759	4.8183	4.7725	4.7351
	6	5.9874	5.1433	4.7571	4.5337	4.3874	4.2839	4.2067	4.1468	4.0990	4.0600
	7	5.5914	4.7374	4.3468	4.1203	3.9715	3.8660	3.7870	3.7257	3.6767	3.6365
	8	5.3177	4.4590	4.0662	3.8379	3.6875	3.5806	3.5005	3.4381	3.3881	3.3472
	9	5.1174	4.2565	3.8625	3.6331	3.4817	3.3738	3.2927	3.2296	3.1789	3.1373
	10	4.9646	4.1028	3.7083	3.4780	3.3258	3.2172	3.1355	3.0717	3.0204	2.9782
	11	4.8443	3.9823	3.5874	3.3567	3.2039	3.0946	3.0123	2.9480	2.8962	2.8536
	12	4.7472	3.8853	3.4903	3.2592	3.1059	2.9961	2.9134	2.8486	2.7964	2.7534
	13	4.6672	3.8056	3.4105	3.1791	3.0254	2.9153	2.8321	2.7669	2.7144	2.6710
	14	4.6001	3.7389	3.3439	3.1122	2.9582	2.8477	2.7642	2.6987	2.6458	2.6022
	15	4.5431	3.6823	3.2874	3.0556	2.9013	2.7905	2.7066	2.6408	2.5876	2.5437
	16	4.4940	3.6337	3.2389	3.0069	2.8524	2.7413	2.6572	2.5911	2.5377	2.4935
	17	4.4513	3.5915	3.1968	2.9647	2.8100	2.6987	2.6143	2.5480	2.4943	2.4499

國立中山大學110學年度
碩士暨碩士專班招生考試試題

科目名稱：微積分【企管系企管甲班碩士班甲組選考、乙組選考、丙組選考】

—作答注意事項—

考試時間：100分鐘

- **考試開始鈴響前不得翻閱試題，並不得書寫、劃記、作答。**請先檢查答案卷（卡）之應考證號碼、桌角號碼、應試科目是否正確，如有不同立即請監試人員處理。
- **答案卷限用藍、黑色筆(含鉛筆)書寫、繪圖或標示**，可攜帶橡皮擦、無色透明無文字墊板、尺規、修正液（帶）、手錶(未附計算器者)。每人每節限使用一份答案卷，不得另攜帶紙張，請衡酌作答。
- 答案卡請以2B鉛筆劃記，不可使用修正液（帶）塗改，未使用2B鉛筆、劃記太輕或污損致光學閱讀機無法辨識答案者，其後果由考生自行負擔。
- 答案卷（卡）應保持清潔完整，不得折疊、破壞或塗改應考證號碼及條碼，亦不得書寫考生姓名、應考證號碼或與答案無關之任何文字或符號。
- 可否使用計算機請依試題資訊內標註為準，如「可以」使用，廠牌、功能不拘，唯不得攜帶具有通訊、記憶或收發等功能或其他有礙試場安寧、考試公平之各類器材、物品（如鬧鈴、行動電話、電子字典等）入場。
- **試題及答案卷（卡）請務必繳回，未繳回者該科成績以零分計算。**
- **試題採雙面列印，考生應注意試題頁數確實作答。**
- **違規者依本校招生考試試場規則及違規處理辦法處理。**

國立中山大學110學年度碩士暨碩士專班招生考試試題

科目名稱：微積分【企管系企管甲班碩士班甲組選考、乙組選考、丙組選考】 題號：441003

※本科目依簡章規定「不可以」使用計算機(問答申論題)

請按題號順序作答，並請寫出推導過程，違者扣分。

1. Find the derivative $\frac{dy}{dx}$ of the following. (15%)
   - i. $y = \frac{3}{x-1} - \frac{1}{x+1}$
   - ii. $y = u^4, u = \frac{1}{3x-1}$
   - iii. $\sqrt{x} + \sqrt{y} = 5$

2. Evaluate the following (25%)
   - i. $\int_0^3 \frac{x}{(20-x^2)^2} dx$. ii $\int_{-\infty}^0 \frac{dx}{\sqrt{1-3x}}$ iii. $\int xe^{5x} dx$
   - iv. $\int \frac{5x^2}{x+1} dx$ v. $\lim_{x\to 0} \frac{2-e^{-x}-e^x}{2x^2}$

3. Sketch the following, indicate roots, local extrema, inflection point, concave structure, and asymptotic lines (if applicable). (20%)

   $f(x) = 8x^5 - 5x^4 - 20x^3$

4 Find the average value of $f(x) = x^4$ over $[0,2]$. (10%)

5. Find $h'(x)$ given $h(x) = \int_0^{x^3} t^3 \cos t dt$. (10%).
6. Find the Taylor polynomial of the 5th degree $P_5(x)$ of $f(x) = e^{-x}$ and the remainder term $R_5(x)$. (10%)

7 A company's total profit from manufacturing and selling x units of their model product is given by $P'(x) = -0.02x^2 + 300x - 200{,}000$ $(0 \le x \le 20{,}000)$
How many units of the products must the company produce to maximize their profits? (10%)

試題請隨卷繳回，請留意背面是否有題

國立中山大學110學年度
碩士暨碩士專班招生考試試題

科目名稱：管理學【企管系企管甲班碩士班甲組選考、乙組選考、丙組選考】

—作答注意事項—

考試時間：100分鐘

- **考試開始鈴響前不得翻閱試題，並不得書寫、劃記、作答。**請先檢查答案卷（卡）之應考證號碼、桌角號碼、應試科目是否正確，如有不同立即請監試人員處理。
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- 答案卡請以2B鉛筆劃記，不可使用修正液（帶）塗改，未使用2B鉛筆、劃記太輕或污損致光學閱讀機無法辨識答案者，其後果由考生自行負擔。
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- **試題及答案卷（卡）請務必繳回，未繳回者該科成績以零分計算。**
- **試題採雙面列印，考生應注意試題頁數確實作答。**
- **違規者依本校招生考試試場規則及違規處理辦法處理。**

國立中山大學 110 學年度碩士暨碩士專班招生考試試題

科目名稱：管理學【企管系企管甲班碩士班甲組選考、乙組選考、丙組選考】　題號：441004

※本科目依簡章規定「不可以」使用計算機(混合題)　

Section A. MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question. 2.5% each, 70% in total.

1. Giant Bikes has 15 different bicycle models that can be created in over 1 million combinations. Each combination is designed to fit the needs of a specific customer. Therefore, the customer chooses the model, size, color, and design they want. An analysis of this company's operation would indicate that it uses

   A) lean manufacturing.
   B) mass customization.
   C) continuous production.
   D) flexible production

2. Given that measuring a firm's financial health is important to its survival, which of the following strategies is good advice for a person just starting a business?

   A) Select an accounting system that helps you make decisions, and helps you report information to others outside your firm.
   B) Accounting systems used by big business are not suitable for small businesses.
   C) All transactions are important. Separating transactions only serves to create a perception that some transactions are of lesser importance than others.
   D) Create a method for keeping your books that makes sense to you. Outside agencies such as creditors and suppliers will not evaluate you by the way you keep books.

3. According to Maslow's Hierarchy of Needs theory, which of the following would be an issue that requires the fulfillment of a lower-order need?

   A) The need for a promotion at work.
   B) The need to locate your business in an area with a low crime rate.
   C) The need for a challenging project at work.
   D) The need for a mentor to help you ascend within the company.

4. Of the following, which is NOT thought to be an advantage of teams within an organization?

   A) new products developed faster at lower costs
   B) increased organizational coherence
   C) more innovation
   D) employee job satisfaction

5. A comparison of the marketing concept and customer relationship management indicates that customer relationship management

   A) and the marketing concept are in fact identical.
   B) turns the marketing concept upside down. The marketing concept emphasized that marketing was the most important function performed by a firm, but customer relationship management views management to be the most important function.
   C) extends the marketing concept by calling for the firm to learn more about its customers so that it not only satisfies them, but exceeds their expectations over time.
   D) attempts to improve profits by keeping quality high, while the marketing concept attempts to improve profits by a careful design of the promotional mix.

6. With respect to taxes, the sole proprietorship

A) pays taxes only if there are no expenses associated with the business.
B) pays taxes on the profits of the business at the same rate that corporations pay taxes.
C) pays taxes on the profits of the business, at the owner's personal tax rate.
D) is permitted to determine its own tax rate and schedule of payments.

7. Alice Wang, a CEO of Business Success Company, encourages employees to participate in the decision-making process but does not give them complete freedom to do as they like. What is her leadership style?

A) democratic
B) monarchial
C) laissez-faire
D) autocratic

8. Experts in operations management for service industry businesses stress

A) using records from accounting to determine what business to go after.
B) training employees to always adhere to only one way of doing things.
C) relying on one's individual operation as opposed to developing partnerships.
D) training employees to please customers by anticipating their needs.

9. The proven success of job specialization lies in the fact that

A) it adds efficiency to the business's operation by identifying tasks that some do better than others.
B) it leads to groupthink.
C) it is a detractor to others who are thinking about entering your industry because it successfully creates barriers to entry.
D) it avoids the pitfalls of division of labor, where workers become removed from thinking conceptually about the business.

10. Mike Chen, a sales manager, just finished reading some sales statistics comparing his company's performance to that of competitors. The statistics summarize a mass of raw figures into a few meaningful measures that Edwin will use to determine whether he needs to change his sales strategy. The statistics in the printout are

A) an example of how managers have a tendency to oversimplify by reducing complex issues into a few simple numbers.
B) data, while the raw figures used to compute the statistics are information.
C) information, while the raw figures used to compute the statistics are data.
D) less useful to Edwin than the raw figures would have been, since summarizing the figures necessarily reduces their accuracy.

11. When consumers calculate the value of a product, they

A) subtract the cost of production from the market price.
B) eliminate all nontangible elements that might affect their perception of the product.
C) look at the benefits the product provides then subtract the cost.
D) identify the variable and the fixed components of the product's benefits.

12. Rick is a human resource manager at a nonprofit. If Rick's organization is like most companies today, which of the following statements about his job is likely to be the most accurate?

A) Government laws and regulations concerning hiring, worker safety, pay, and unionization will make Rick's work complex and challenging.
B) Rick's job will be simpler in the future than it was in the past, because the percentage of new workers entering the labor force who are poorly educated and unprepared for work is slowly but steadily declining.
C) Most of Rick's time will be devoted to clerical duties such as processing payroll checks and keeping employee files updated.
D) Rick and his fellow human resource managers will be given complete responsibility for performing all human resource functions within the organization.

13. When managers work on creating conditions and systems to ensure that everything and everyone works together to achieve the organization's goals, they are involved in the_____ function of management.

A) planning
B) organizing
C) controlling
D) leading

14. Which of the following is an example of a structural organizational change?

A) changing employee attitudes
B) purchasing new work equipment
C) changing work practices
D) changing managerial span of control

15. During the storming stage of group development, high levels of conflict _____.

A) increase group cohesiveness
B) are never a factor in group effectiveness
C) can contribute to group effectiveness
D) are necessary for group cohesiveness

16. Resource development is

A) the study of how society chooses to employ resources to produce goods and services and distribute them for consumption among various competing groups and individuals.
B) the part of economics that looks at particular markets.
C) the study of how to increase the amount of available resources and create conditions that will make better use of these resources.
D) the part of economics that looks at the operation of a nation's economy as a whole.

17. Which of the following refers to a group of products offered by a firm that are physically similar or are intended for a similar market?

A) product line
B) total product offer
C) product matrix
D) product mix

18. As a factor of production, the term *capital* includes:

A) Natural resources such as land and water.
B) Services provided by the government that enable businesses to be more productive.
C) Stocks and bonds issued by corporations.
D) Tools, machinery, and buildings.

19. Which of the following activities would be a part of the leading function of management?

A) Recruiting qualified workers to join the organization and assigning them to their proper position.
B) Examining a financial report to see whether the firm's profits are improving and taking corrective action if they are not.
C) Devising a new strategic plan to enter a new foreign market currently dominated by a competing firm.
D) Training and coaching workers to help them understand their job and perform it effectively.

20. A major part of the controlling function of management is to _____.

A) correct performance problems
B) formulate strategies
C) structure an organization
D) set standards

21. TSMC and MediaTek have insourced for years to design and manufacture semiconductors in Taiwan. Insourcing

A) causes jobs to be lost to overseas competitors.
B) damages the Taiwanese economy.
C) helps offset the number of jobs being outsourced.
D) increases the number of jobs being outsourced.

22. Expenses a firm incurs for insurance, office salaries, and rent are classified as

A) general expenses on an income statement.
B) general expenses on a cash flow statement.
C) selling expenses on an income statement.
D) current liabilities on a balance sheet.

23. Undercapitalization refers to the problem of

A) insufficient start-up funds.
B) inadequate control of expenses.
C) undervalued capital stock.
D) inappropriate cash flows.

24. A common characteristic of most entrepreneurs is that they

A) possess a great deal of personal wealth.
B) have a high level of scientific and technical expertise.
C) have experience in running large, complex organizations.
D) accept the risks involved in starting and managing a business.

25. Which of the following statements about channels of distribution is most accurate?

A) Channels of distribution always begin with a manufacturer and end with consumers, and always have one or more marketing intermediaries in between.
B) The fewer the marketing intermediaries in a channel of distribution, the more efficient the channel is likely to be.
C) Some channels of distribution include marketing intermediaries, while in others a manufacturer sells directly to the final consumer.
D) Channels of distribution always include retailers, but they may or may not also include wholesalers.

26. In order to transmit a message, the thought originating with the sender must be _____ to symbolic form.

A) deciphered
B) encoded
C) decoded
D) expanded

27. According to Herzberg, job-related factors that motivated workers to work harder and more productively had one thing in common:

A) they were easy to explain and easy to measure.
B) they were related to job content.
C) they allowed more productive employees to receive higher compensation.
D) they focused on making the jobs performed by employees simpler to accomplish.

28. The process of setting up individual functional units of the business to do specialized tasks is called

A) departmentalization.
B) delegation of authority.
C) division of labor.
D) job specialization.

Section B. SHORT ESSAY. Write up your answers in English or in Chinese. 30% in total.

1. With the growing threat of COVID-19 hitting the world full force, the prospect of having to work from home is becoming increasingly likely for a wide swath of workers. We have been witnessing that normal work patterns, modes of communication, and team dynamics have been disrupted. The increasing uncertainty and anxiety about the personal dangers from the epidemic and its impact on the economy will make the challenge of adjusting to these work changes even greater. What are the strategies that leaders can employ to ensure their teams continue to collaborate effectively and maintain momentum in the business? Provide at least three strategies and elaborate how each of them contributes to the desired outcome. (15%)

2. For decades, the Porter's five forces model of competition has dominated the thinking about business strategy. It describes competition among traditional "pipeline" businesses, which succeed by optimizing the activities in their value chains—most of which they own or control. "Platform" businesses however that bring together consumers and producers, as Uber, Alibaba, and Airbnb do, require a different approach to strategy. Read the following article adapted from Harvard Business Review (2016) and answer the given questions.

Pipelines, Platforms, and the New Rules of Strategy

Back in 2007 the five major mobile-phone manufacturers—Nokia, Samsung, Motorola, Sony Ericsson, and LG—collectively controlled 90% of the industry's global profits. That year, Apple's iPhone burst onto the scene and began gobbling up market share. By 2015 the iPhone singlehandedly generated 92% of global profits, while all but one of the former incumbents made no profit at all.

How can we explain the iPhone's rapid domination of its industry? And how can we explain its competitors' free fall? Nokia and the others had classic strategic advantages that should have protected them: strong product differentiation, trusted brands, leading operating systems, excellent logistics, protective regulation, huge R&D budgets, and massive scale. For the most part, those firms looked stable, profitable, and well entrenched.

Certainly the iPhone had an innovative design and novel capabilities. But in 2007, Apple was a weak, nonthreatening player surrounded by 800-pound gorillas. It had less than 4% of market share in desktop operating systems and none at all in mobile phones. As we'll explain, Apple (along with Google's competing Android system) overran the incumbents by exploiting the power of platforms and leveraging the new rules of strategy they give rise to. Platform businesses bring together producers and consumers in high-value exchanges. Their chief assets are information and interactions, which together are also the source of the value they create and their competitive advantage.

Pipeline to Platform

Platforms have existed for years. Malls link consumers and merchants; newspapers connect subscribers and advertisers. What's changed in this century is that information technology has profoundly reduced the need to own physical infrastructure and assets. IT makes building and scaling up platforms vastly simpler and cheaper, allows nearly frictionless participation that strengthens network effects, and enhances the ability to capture, analyze, and exchange huge amounts of data that increase the platform's value to all. You don't need to look far to see examples of platform businesses, from Uber to Alibaba to Airbnb, whose spectacular growth abruptly upended their industries.

Though they come in many varieties, platforms all have an ecosystem with the same basic structure, comprising four types of players. The *owners* of platforms control their intellectual property and governance. *Providers* serve as the platforms' interface with users. *Producers* create their offerings, and *consumers* use those offerings (see Figure in the next page).

To understand how the rise of platforms is transforming competition, we need to examine how platforms differ from the conventional "pipeline" businesses that have dominated industry for decades. Pipeline businesses create value by controlling a linear series of activities—the classic value-chain model. Inputs at one end of the chain (say, materials from suppliers) undergo a series of steps that transform them into an output that's worth more: the finished product. Apple's handset business is essentially a pipeline. But combine it with the App Store, the marketplace that connects app developers and iPhone owners, and you've got a platform. The move from pipeline to platform involves three key shifts:

1. From resource control to resource orchestration.

The resource-based view of competition holds that firms gain advantage by controlling scarce and valuable—ideally, inimitable—assets. In a pipeline world, those include tangible assets such as mines and real estate and intangible assets like intellectual property. With platforms, the assets that are hard to copy are the community and the resources its members own and contribute, be

they rooms or cars or ideas and information. In other words, the network of producers and consumers is the chief asset.

2. From internal optimization to external interaction.

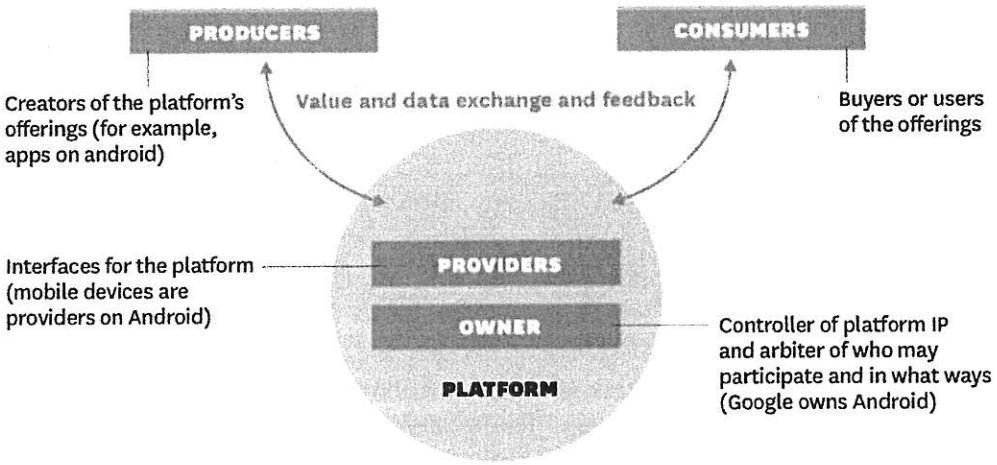
Pipeline firms organize their internal labor and resources to create value by optimizing an entire chain of product activities, from materials sourcing to sales and service. Platforms create value by facilitating interactions between external producers and consumers. Because of this external orientation, they often shed even variable costs of production. The emphasis shifts from dictating processes to persuading participants, and ecosystem governance becomes an essential skill.

3. From a focus on customer value to a focus on ecosystem value.

Pipelines seek to maximize the lifetime value of individual customers of products and services, who, in effect, sit at the end of a linear process. By contrast, platforms seek to maximize the total value of an expanding ecosystem in a circular, iterative, feedback-driven process. Sometimes that requires subsidizing one type of consumer in order to attract another type.

The Players in a Platform Ecosystem

A platform provides the infrastructure and rules for a marketplace that brings together producers and consumers. The players in the ecosystem fill four main roles but may shift rapidly from one role to another. Understanding the relationships both within and outside the ecosystem is central to platform strategy.



SOURCE MARSHALL W. VAN ALSTYNE, GEOFFREY G. PARKER, AND SANGEET PAUL CHOUDARY FROM "PIPELINES, PLATFORMS, AND THE NEW RULES OF STRATEGY," APRIL 2016 HBR.ORG

2.1. Based on the article information, identify the differences between pipeline and platform businesses? (5%)

2.2. Given such differences between pipeline and platform businesses, evaluate if the competitive forces described by Michael Porter still apply. (10%)