一、設某試驗結果資料整理如下表，試回答下列問題（每格2分）：

處理(x)	1	1	1	2	2	3	3	4	4	4
結果(y)	8	12	10	8	4	2	6	2	6	4
$(\Sigma x)^2=625$，$\Sigma x^2=77$					$(\Sigma y)^2=3844$，$\Sigma y^2=484$					
$(\Sigma x)(\Sigma y)=1550$，$\Sigma xy=126$										

1. 以直線迴歸分析結果：
   (a)迴歸係數b＝＿＿(a)＿＿、(b)迴歸方程式y＝＿＿(b)＿＿、
   (c)迴歸平方和SSR＝＿＿(c)＿＿、(d)剩餘均方S^2＝＿＿(d)＿＿、
   (e)F檢定結果：＿＿(e)＿＿（理論F值＝5.32）。

2. 以ANOVA分析法得：
   (f)處理均方MST＝＿＿(f)＿＿、(g)機差均方MSE＝＿＿(g)＿＿、
   (h)F檢定結果：＿＿(h)＿＿（理論F值＝4.76）。

3. 直線性測驗得：
   (i)離直線差SS＝＿＿(i)＿＿、(j)F檢定值＝＿＿(j)＿＿。

4. 直線性測驗結果若顯著，則表示各處理效果間＿(k)＿直線關係，因此上述資料應採用＿(l)＿分析法做檢定。

5. 資料若具直線性，ANOVA的power較直線迴歸分析者爲＿(m)＿。

6. 上述資料的相關係數r＝＿(n)＿，檢定其顯著性時，t的自由度爲＿(o)＿。

二、回答下列問題（每題5分）：

1. ANOVA的原設(assumptions)有那些？
2. 試述在ANOVA之前進行變數變換(transformation)的種類和時機。
3. 如何減少第二類錯誤的機率？
4. 試證 $t^2_{(\nu)}=F_{(1,\nu)}$。

三、　10分

In an effort to locate new venture investment opportunities for its clients, a major investment banking company asked five of its experienced business analysts to review the business plans of four new ventures seeking investment capital. Business plans for the four new ventures were assigned to the analysts in random order, with the analysts each being asked to rank the new ventures in order of performance. Their responses are provided in Table 1 . Do the data present sufficient evidence to assume that a difference exists among the preferences of analysts for these four new business ventures? Test by using $\alpha = .05$.

Analyst	New Business Venture			
	1	2	3	4
A	3	1	4	2
B	1	2	4	3
C	2	1	4	3
D	3	1	4	2
E	1	2	3	4

TABLE 1

四、　10分

Each customer who enters Larry's clothing store will purchase a suit with probability p. If the number of customers entering the store is Poisson distributed with mean λ, what is the probability that Larry does not sell any suits?

五.

Let $X_1, X_2, \ldots, X_n$ be a random sample from a uniform distribution on the interval $[0, \theta]$, so that

$$f(x) = \begin{cases} \dfrac{1}{\theta} & 0 \leq x \leq \theta \\ 0 & \text{otherwise} \end{cases}$$

Then if $Y = \max(X_i)$, it can be shown that the random variable $U = Y/\theta$ has density function

$$f_U(u) = \begin{cases} nu^{n-1} & 0 \leq u \leq 1 \\ 0 & \text{otherwise} \end{cases}$$

10分 1. Use $f_U(u)$ to verify that

$$P\left((\alpha/2)^{1/n} \leq \frac{Y}{\theta} \leq (1 - \alpha/2)^{1/n}\right) = 1 - \alpha$$

and use this to derive a $100(1 - \alpha)\%$ confidence interval for θ.

5分 2. Verify that $P(\alpha^{1/n} \leq Y/\theta \leq 1) = 1 - \alpha$, and derive a $100(1 - \alpha)\%$ confidence interval for θ based on this probability statement.

15分 3. Which of the two intervals derived above is shorter? If my waiting time for a morning bus is uniformly distributed and observed waiting times are $x_1 = 4.2$, $x_2 = 3.5$, $x_3 = 1.7$, $x_4 = 1.2$, and $x_5 = 2.4$, derive a 95% confidence interval for θ by using the shorter of the two intervals.

$$\chi^2_{0.01, 4} = 13.28, \quad \chi^2_{0.05, 4} = 9.48, \quad \chi^2_{0.01, 5} = 15.09$$

$$\chi^2_{0.05, 5} = 11.07, \quad \chi^2_{0.01, 3} = 11.34, \quad \chi^2_{0.05, 3} = 7.81$$