1. The following table shows the distribution of blood types in the general population. (16%)

	A	B	AB	O
Rh+	32%	7%	3%	30%
Rh-	8%	4%	2%	14%

   (1) What is the probability a person will have type O blood? (2%)
   (2) What is the probability a married couple will both be Rh+? (2%)
   (3) What is the probability a married couple will both have type B blood? (2%)
   (4) What is the probability a person will be Rh- given she or he has type O blood? (5%)
   (5) What is the probability a person will have type A blood given she or he is Rh+? (5%)

2. The lifetime (hours) of an electronic device is a random variable with the following probability density function. (12%)
$$f(x) = 0.025e^{-0.025x}, \quad x \geq 0$$

   (1) What is the mean lifetime of the device? (2%)
   (2) What is the probability that the device will fail in the first 40 hours of operation? (5%)
   (3) Given that the device has been operated 100 hours, what is the probability that it can be operated for 20 more hours before it fails? (5%)

3. Let X_1, X_2 be a random sample of size $n_1 = 2$ from $N(1,1)$ and Y_1, Y_2 be a random sample of size $n_2 = 2$ from $N(0,1)$. Suppose X_i's are independent of the Y_i's. (10%)

   (1) What is the distribution of $\dfrac{(X_1 + X_2 - 2)^2}{(X_2 - X_1)^2}$? (5%)

   (2) What is the distribution of $\bar{X} + \bar{Y}$? (5%)

4. A USA *Today*/CNN/Gallup survey of 452 working parents found 280 who said they spend too little time with their children because of work commitments. (12%)
   (1) What is the point estimate of the proportion of the population of working parents who feel they spend too little time with their children because of work commitments? (2%)
   (2) At 95% confidence, what is the margin of error? (5%)
   (3) What is the 95% confidence interval estimate of the population proportion of working parents who feel they spend too little time with their children because of work commitments? (5%)

簡答題：請簡要回答，切勿長篇大論。

1. 在進行母體平均數檢定時，有時候用 t 分配，有時候卻用常態分配，請說明理由為何？（10%）

2. 當我們用 t 分配進行母體平均數檢定時，又分為好幾種不同的情境，不同的狀況之下，檢定統計量的計算方式不同，這又是為什麼呢？（10%）

3. 當我們搜集了一筆資料要進行檢定時，不管假說怎麼寫，檢定統計量都相同，我們該如何決定採用雙尾檢定、右尾檢定、左尾檢定？請舉例說明之。（10%）

4. 請繪圖說明型 I 誤差和型 II 誤差之間的關係。（10%）

5. 請繪圖說明最小平方法的基本精神所在。（10%）