

1. (10 points) The time for an automated system in a warehouse to locate a part is normally distributed with mean 45 seconds and standard deviation 30 seconds. Suppose that independent requests are made for 10 parts.
- (a) What is the probability that the average time to locate 10 parts exceeds 60 seconds?
- (b) What is the probability that the total time to locate 10 parts exceeds 600 seconds?

2. (10 points) $f(x) = k(1+2x)$ for $0 < x < 2$ is a probability density function. Evaluate the probability of x between 0 and 1.

3. (20 points) Show that the mean of a geometric distribution (幾何分配) with a probability of success p is $1/p$.

4. (20 points) The following data are collected in a random experiment.

11.48	11.45	11.48	11.47	11.48
11.50	11.42	11.49	11.45	11.44
11.45	11.47	11.46	11.47	11.43
11.50	11.49	11.45	11.46	11.47

- (a) Test the hypothesis $H_0: \mu=11.5$ versus $H_1: \mu \neq 11.5$ using $\alpha=0.05$.
- (b) Find the P-value (approximation is sufficient).
- (c) Construct a two-sided confidence interval on the mean to test the hypotheses in Part (a).

5. (20 points) An experiment was conducted on a new model of a particular make of automobile to determine the stopping distance at various speeds. The following data were recorded.

Speed, x (km/hr)	35	50	65	80	95	110
Stopping distance, y (m)	16	26	41	62	88	119

- (a) Derive the normal equations (正規方程式) for the polynomial regression $\hat{y} = b_0 + b_1x + b_2x^2$.
- (b) Fit the polynomial regression equation in part (a).

6. (20 points) Severe thunderstorms have been recorded at a given station over a period of 66 years. During this period, the frequencies of severe thunderstorms observed are as follows:

# of thunderstorms	0	1	2	3	4
Years	20	23	15	6	2

Determine if the annual number of severe thunderstorms follow Poisson distribution with $\lambda=1$ thunderstorm per year, at 0.05 significance level.

見背面

