

1. Let X and Y be independent random variables each having the normal density $N(0, \sigma^2)$. Find the density of $Z_1 = X + Y$ and $Z_2 = X^2 + Y^2$. (正確給 20 分)
2. Suppose the times of successive failures of a machine form a Poisson process on $[0, \infty)$ with parameter λ . What is the probability of at least one failure during the time period $(t, t+h)$, $h > 0$? (正確給 20 分)
3. Based on a random sample of size n , find the maximum likelihood estimator of p for the geometric density: $f(x|p) = p(1-p)^x$, $x = 0, 1, 2, \dots$ (正確給 20 分)
4. The following data give the velocity (y) of a river in feet per second corresponding to various depths expressed in terms of the ratio (x) of the measured depth to the depth of the river. Use least squares to fit a parabola $y = a + bx + cx^2$ to these points, choosing $x - 0.4$ rather than x as the independent variable. (正確給 20 分)

x	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8
y	3.20	3.23	3.25	3.26	3.25	3.23	3.18	3.13	3.06

5. Why do we utilize a F -distribution for the decision in an analysis of variances (ANOVA)? What situations in a hypothesis test could utilize the method of ANOVA? (正確給 20 分)

試題隨卷繳回