

淡江大學九十學年度碩士班招生考試試題

系列：運輸管理學系

科目：統計學

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本試題共 3 頁

本試題雙面印製

- Suppose the mean number of car accidents per month at a particular intersection is 3.4. Find the mean, variance, and standard deviation of x , the number of accidents in a randomly selected month. Is it likely that x will be large as 12? (15%)
- Given the joint pdf

$$f(x,y) = (\alpha\beta/4) \exp(-\alpha|x| - \beta|y|)$$
 - Find the expectation of $g(X,Y) = XY$. (10%)
 - Obtain the expectation of $h(X,Y) = X^2 + Y^2$. (10%)
- It has been found through experience that a large variety of velocity measurements have approximately normal distributions. Suppose that the velocity between two observation points on a highway is a random variable having a normal distribution with mean of 43.5 km/h and a standard deviation of 5.9 km/h. Using Table 1, find
 - the probability that the velocity is from 40.0 km/h to 50.0 km/h. (10%)
 - the probability that the velocity is at least 55.0 km/h. (10%)
- Suppose the following statistics were calculated based on a random sample of $n=30$ measurements with a mean of 73 and a standard deviation of 13. Perform a test of
 $H_0: \mu = 72$
 $H_1: \mu > 72$
 at a significance level of $\alpha = 0.05$ (Table 1). (15%)
- The following is the distribution of the hourly number of trains arriving at a railway station:

<u>Trains arriving per hour</u>	<u>Frequency</u>
0	312
1	139
2	39
3	8
4	1
5	1

Find the mean of this distribution, and using its mean (rounded to one decimal) as the Parameter λ , fit a Poisson distribution. Test for goodness of fit at the level of significance $\alpha = 0.05$ (Table 2). (15%) Hint: The pdf function of Poisson distribution is $f(x) = \lambda^x e^{-\lambda} / x!$, for $x=0, 1, 2, 3, \dots$

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Table 2
VALUES OF χ^2_0*

ν	$\alpha=0.995$	$\alpha=0.99$	$\alpha=0.975$	$\alpha=0.95$	$\alpha=0.05$	$\alpha=0.025$	$\alpha=0.01$	$\alpha=0.005$	ν
1	0.0000393	0.000157	0.000982	0.00393	3.841	5.024	6.635	7.879	1
2	0.0100	0.0201	0.0506	0.103	5.991	7.378	9.210	10.597	2
3	0.0717	0.115	0.216	0.352	7.815	9.348	11.345	12.838	3
4	0.207	0.297	0.484	0.711	9.488	11.143	13.277	14.860	4
5	0.412	0.554	0.831	1.145	11.070	12.832	13.086	16.750	5
6	0.676	0.872	1.237	1.635	12.592	14.449	16.812	18.548	6
7	0.989	1.239	1.690	2.167	14.067	16.013	18.475	20.278	7
8	1.344	1.646	2.180	2.733	15.507	17.535	20.090	21.955	8
9	1.735	2.088	2.700	3.325	16.919	19.023	21.666	23.589	9
10	2.156	2.558	3.247	3.940	18.307	20.483	23.209	25.188	10
11	2.603	3.053	3.816	4.575	19.675	21.920	24.725	26.757	11
12	3.074	3.571	4.404	5.226	21.026	23.337	26.217	28.300	12
13	3.565	4.107	5.009	5.892	22.362	24.736	27.688	29.819	13
14	4.075	4.660	5.629	6.571	23.685	26.119	29.141	31.319	14
15	4.601	5.229	6.262	7.261	24.996	27.488	30.578	32.801	15
16	5.142	5.812	6.908	7.962	26.296	28.845	32.000	34.267	16
17	5.697	6.408	7.564	8.672	27.587	30.191	33.409	35.718	17
18	6.265	7.015	8.231	9.390	28.869	31.526	34.805	37.156	18
19	6.844	7.633	8.907	10.117	30.144	32.852	36.191	38.582	19
20	7.434	8.260	9.591	10.851	31.410	34.170	37.566	39.997	20
21	8.034	8.897	10.283	11.591	32.671	35.479	38.932	41.401	21
22	8.643	9.542	10.982	12.338	33.924	36.781	40.289	42.796	22
23	9.260	10.196	11.689	13.091	35.172	38.076	41.638	44.181	23
24	9.886	10.856	12.401	13.844	36.415	39.364	42.980	45.558	24
25	10.520	11.524	13.120	14.611	37.652	40.646	44.314	46.928	25
26	11.160	12.198	13.844	15.379	38.885	41.923	45.642	48.290	26
27	11.808	12.879	14.573	16.151	40.113	43.194	46.963	49.645	27
28	12.461	13.565	15.308	16.928	41.337	44.461	48.278	50.993	28
29	13.121	14.256	16.047	17.708	42.557	45.772	49.588	52.336	29
30	13.787	14.953	16.791	18.493	43.773	46.979	50.892	53.672	30