國立中央大學107學年度碩士班考試入學試題

參考用

所別： 企業管理學系 碩士班 一般甲組(一般生)
企業管理學系 碩士班 一般乙組(一般生)
企業管理學系 碩士班 一般丁組(一般生)
企業管理學系 碩士班 一般戊組(一般生)

科目： 統計學

本科考試禁用計算器

＊請在答案卷內作答

請提供運算推演過程，並將最後答案劃底線標示清楚。

Q1. (10 POINTS total) Transitional matrix (人力變遷矩陣) is a table used to project internal labor supply. The matrix shows the proportion or number (in parenthesis) of employees in different job categories at different times and how people move from one job to another in the organization and how many people enter and leave the organization. Use the following table to answer:

Job A Top Management	40	**a)**	.15 (6)	.20 (8)			.05 (2)
Job B Mid Management	60	.10 (6)	**b)**	.05 (3)			.05 (3)
Job C Low Management	80	.05 (4)	.05 (4)	.60 (48)	.10 (8)	.10 (8)	**c)**
Job D Skilled Worker	160				.80 (128)		.20 (32)
Job E Assembly	240				.20 (48)	.60 (144)	.20 (48)
Total	580	34	58	59	184	152	
Need Recruits?		6	2	21	-24	88	

(a) What is the % of employees remaining in Cell A (of Job A) (2%)?
(b) What is the number of employees in Cell B (of Job B) (2%)?
(c) What is the turnover rate (%) of Job C (in Cell C) (2%)?
(d) What job may need to lay off employees (2%)?
(e) If no employee is terminated, what is the total number of new recruits (2%)?

Q2. (8 POINTS total) Selection ratio (選擇率) refers to the number hired divided by number applied for the job. **Adverse impact (不利影響)** refers to the type of discrimination that an employer practice (i.e., selection test) did have an adverse impact on the group to which the plaintiff belongs (i.e., protected group). The Uniform Guidelines (1978) suggest using an 80 percent or 4/5ths rule. That is, if it can be shown that a protected group received only 80 percent of the desirable outcomes received by a majority group, the plaintiffs can claim that they have met their burden of demonstrating adverse impact. In Company X, 100 nonminorities apply for a job and 20 were selected, while 25 minorities applied and 3 were hired. (a) Based on the 4/5ths rule, at least how many minorities should be hired (4%)?
(b) Is there evidence of adverse impact (4%)?

尚有試題，請繼續

注意:背面有試題

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Q3. (10 POINTS total) A researcher is interested in how driving accidents are related to driver gender and whether the driver possesses a valid driver's license. He summarized the data in the following table. What is the conditional probability that a male driver in an accident, given that he has no valid driver's license?

	Driver Gender	
License	Man	Woman
Invalid	6	4
Valid	34	16

Q4. (16 POINTS total) Professor P recruited a sample of 100 fellow professors at Noble Cares University (NCU) and found their average IQ score to be 157 based on NCU IQ Test. The NCU IQ Test has a mean of 100 and standard deviation of 15. Standard error of measurement (SEM) is defined as "the standard deviation of errors of measurement that is associated with the test scores for a specified group of test takers", which is calculated as: $SEM = S_x\sqrt{1 - r_{xx'}}$, where S_x refers to the standard deviation of the test, and $r_{xx'}$ refers to the reliability of the test. Refer to the following table:

z	p	z	p	z	p	z	p	z	p	z	p	z	p	z	p
.00	.500000	.50	.308538	1.00	.158655	1.50	.066807	2.00	.022750	2.50	.006210	3.00	.001350	3.50	.000233
.10	.460172	.60	.274253	1.10	.135666	1.60	.054799	2.10	.017864	2.60	.004661	3.10	.000968	3.60	.000159
.20	.420740	.70	.241964	1.20	.115070	1.70	.044565	2.20	.013903	2.70	.003467	3.20	.000687	3.70	.000108
.30	.382089	.80	.211855	1.30	.096800	1.80	.035930	2.30	.010724	2.80	.002555	3.30	.000483	3.80	.000072
.40	.344578	.90	.184060	1.40	.080757	1.90	.028717	2.40	.008198	2.90	.001866	3.40	.000337	3.90	.000048

(a) Convert the IQ score to standard score to obtain the percentile rank (4%).
(b) Based on the sample of 100 and sample standard deviation of 15, calculate the 95% confidence interval around IQ score = 157 (4%).
(c) If the NCU IQ Test has almost perfect reliability of .99, calculate SEM (2%).
(d) If the NCU IQ Test has marginal reliability of .64, calculate SEM (2%).
(e) If Professor P scored 95 percent on NCU IQ Test, and Observed score = True score ± Error (in this case, SEM), what is the range around the true score (4%)?

Q5. (30 POINTS total) For the following data set X= (2, 3, 4, 4, 4) and Y= (3, 6, 6, 6, 6):
1) What is ΣX and ΣY (2%)?
2) What is ΣX^2 and ΣY^2 (2%)?
3) What is ΣXY (2%)?
4) What is sample variance s^2 (4%)?
5) What is the Covariance of X and Y (4%)?
6) What is the Correlation Coefficient of X and Y (4%)?
7) What is the % predictable variability（四捨五入到小數點三位）(4%)?
8) Regress Y on X, what is the regression coefficient for the slope (4%)?
9) Regress Y on X, what is the regression coefficient for the intercept（計算中不四捨五入，答案到小數點三位）(4%)?

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Q6. (26 POINTS total) A researcher is interested in the relationship between age (Younger vs Older) and gender (Male vs Female) in terms of response time on pressing a button. The data are presented here:

	Younger	Older	Marginal Means
Male	1 2 3	2 4 6	
Female	2 3 4	4 5 6	
Marginal Means			

a) Calculate the main effects: SS_{total}, SS_{age}, SS_{gender} (6%).

b) Calculate the interaction effect SS_{cell} and error SS_{error}, (4%).

c) What are your conclusions (6%)?

d) Complete the ANOVA summary table (10%).（答案到小數點二位、每格 1 分扣完為止）

Source	*SS*	*df*	*MS*	*F*
Age				
Gender				
Interaction				
Error				
Total				

F Table for $\alpha = 0.05$

df1 / df2	1	2	3	4	5	6	7	8	9	10	12	∞
1	161.45	199.50	215.71	224.58	230.16	233.99	236.77	238.88	240.54	241.88	243.91	254.31
2	18.51	19.00	19.16	19.25	19.30	19.33	19.35	19.37	19.38	19.40	19.41	19.50
3	10.13	9.55	9.28	9.12	9.01	8.94	8.89	8.85	8.81	8.79	8.74	8.53
4	7.71	6.94	6.59	6.39	6.26	6.16	6.09	6.04	6.00	5.96	5.91	5.63
5	6.61	5.79	5.41	5.19	5.05	4.95	4.88	4.82	4.77	4.74	4.68	4.37
6	5.99	5.14	4.76	4.53	4.39	4.28	4.21	4.15	4.10	4.06	4.00	3.67
7	5.59	4.74	4.35	4.12	3.97	3.87	3.79	3.73	3.68	3.64	3.57	3.23
8	5.32	4.46	4.07	3.84	3.69	3.58	3.50	3.44	3.39	3.35	3.28	2.93
9	5.12	4.26	3.86	3.63	3.48	3.37	3.29	3.23	3.18	3.14	3.07	2.71
10	4.96	4.10	3.71	3.48	3.33	3.22	3.14	3.07	3.02	2.98	2.91	2.54
11	4.84	3.98	3.59	3.36	3.20	3.09	3.01	2.95	2.90	2.85	2.79	2.40
12	4.75	3.89	3.49	3.26	3.11	3.00	2.91	2.85	2.80	2.75	2.69	2.30

試題結束。作答請提供運算推演過程，並將最後答案劃底線標示清楚