Quiz 1 - Solution

STAT 328	Academic year 1441 H	Send you answer before 14/6/1441 -9:00PM
Statistical Methods	Second Semester	By E-mail for: wemam.c@ksu.edu.sa

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Write Excel commands with the results to calculate the following:

Question 1

The following data represents sample of size **5** student in the final exam of stat1 and stat2:

Student	1	2	3	4	5
stat1	75	82	90	88	93
stat2	90	84	92	81	75

(a) Write a descriptive statistics report about the data showing, the mean, variance, coefficient of the variation for the sum of stat1 and stat2.

	sum
Mean	170.00
Standard Deviation	6.892
Sample Variance	47.50
coefficient of the variation	4.054%
Confidence Level(95.0%)	8.557

(b) Find 95% CI for the mean of sum.

95% CI= mean∓8.557=$(161.442, 178.557)$

(c) Test the difference between the overall means of stat1 and stat2.

$H_0: \sigma_1^2 = \sigma_2^2$ vs $H_1: \sigma_1^2 \neq \sigma_2^2$

F-Test Two-Sample for Variances		
F	1.085	
P(F<=f) one-tail	0.470	
F Critical one-tail	6.388	

Since F=1.085<F critical=6.388 and P(F<=f) one-tail = 0.470 > 0.05 then the variances are equal and then we must use Two-Sample Assuming Equal Variances

$H_0: \mu_1 = \mu_2$ vs $H_1: \mu_1 \neq \mu_2$

t-Test: Two-Sample Assuming Equal Variances		
t Stat	0.270	
P(T<=t) one-tail	0.397	
t Critical one-tail	1.860	
P(T<=t) two-tail	0.794	
t Critical two-tail	2.306	

Since t Stat = 0.270 < 2.306 = t Critical two-tail and P(T<=t) two-tail = 0.794>0.05 then we can't reject H_0 and so, $\mu_1 = \mu_2$

(d) Calculate the correlation coefficient between the marks of stat1 and stat2.

	stat1	*stat2*
stat 1	1	
stat 2	-0.519	1

Question 2

Let $A = \begin{bmatrix} 2 & 1 & 0 \\ 1 & 0 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 3 & 1 & 2 & 1 \\ 1 & 0 & 1 & 2 \\ 5 & 4 & 1 & 1 \end{bmatrix}$

Then calculate

(i) AB

=MMULT(L18:N19,L21:N23)

7	2	5	4
23	17	6	5

(ii) The determinant of $B'B$

=MMULT(B1:D2,B5:E7)
=MDETERM(L6:O9) = 0

(iii) The inverse of BB'

=TRANSPOSE(L21:N23)
=MMULT(V7:X9,L21:N23)=
=MINVERSE(L17:N19)

0.534435	-0.34435	-0.20937
-0.34435	0.443526	0.093664
-0.20937	0.093664	0.112948

Question 3

Write Excel commands with the results to calculate the following:

(1) Find k when $P(X > k) = 0.04, \quad X \sim F(10,11)$

=F.INV(1-0.04,10,11) = 3.062037

(2) $P(2 \le X < 7) \quad when \quad X \sim Poisson(3.5)$

=POISSON.DIST(6,3.5,TRUE)-POISSON.DIST(1,3.5,TRUE)
= 0.798824

(3) P(T < c)=0.085 $\quad X \sim t\ distribution$ with 6 degree of freedom.

=T.INV(0.085,6) = -1.55905

(4) $$\int_1^2 e^{\frac{-x^2}{8}} dx =$$

$= 2\sqrt{2\pi}\ P(1 \le X \le 2) \qquad\qquad X \sim N(0,4)$

= 2*SQRT(2*PI())*(NORM.DIST(2,0,2,TRUE)-NORM.DIST(1,0,2,TRUE)) = 0.751398

(5) $$\sum_{i=7}^{10} \binom{10}{i} (0.4)^i (0.6)^{10-i} =$$

$= P(7 \le X \le 10) \qquad\qquad X \sim Binomial(10,0.4)$

=BINOM.DIST(10,10,0.4,TRUE)-BINOM.DIST(6,10,0.4,TRUE)
= 0.054762

(6) $\sqrt[10]{\sqrt{10!}} =$

=(SQRT(FACT(10))^0.1) = 2.128081

=(SQRT(FACT(10)))^0.1= 2.128081

(7) $\binom{8}{4} =$

=COMBIN(8,4) = 70

(8) $\ln(\sqrt{7}) =$

=LN(SQRT(7)) = 0.972955075

(9) $\sum_{x=9}^{80} \log(7) \frac{3^x}{x!}$

$= \sum_{x=9}^{80} \log(7) \frac{3^x}{x!} \frac{e^{-3}}{e^{-3}} = \log(7) e^3 \sum_{x=9}^{80} \frac{3^x e^{-3}}{x!}$

$= \log(7) e^3 \left[P(9 \le X \le 80)\right] = \log(7) e^3 \{P(X \le 80) - P(X \le 8)\}$

=LOG10(7)*EXP(3)*(POISSON.DIST(80,3,TRUE)-POISSON.DIST(8,3,TRUE))
= 0.064553

(10) $\prod_{x=4}^{10} \frac{(x^2 - 2x + 1)}{(x - 1)}$

x	(x^2-2*x+1)/(x-1)		181440
4	3		
5	4	=PRODUCT(B2:B8)	
6	5		
7	6		
8	7		
9	8		
10	9		

(11) Find k when $\mathrm{P}\left(-\frac{\mathrm{k}}{2} < \mathrm{X} < \frac{\mathrm{k}}{2}\right) = 0.92, \quad \mathrm{X} \sim \mathrm{t}(10)$

$= 1 - 2 * P(X < -k/2) = 0.92 \implies P(X < -k/2) = 0.04$

$= T.INV(0.04,10) = -1.948 \implies -k = -3.8962 \implies k = 3.8962$