IT3030 Biostatistics Quiz#4　　　2019.04.23　ID:_____　Name:_____

1. (30%) Complete the following table for the "Sampling Distributions of Statistics for samples of size 2 drawn with replacement from the population (2, 5, 8)".

Sample	Mean value	Variance	Standard deviation
(2, 2)	2.0	0	0
(2, 5)	(a)=3.5	(i)=4.5	(q)=2.12
(2, 8)	(b)=5.0	(j)=18	(r)=4.24
(5, 2)	(c)=3.5	(k)=4.5	(s)=2.12
(5, 5)	5.0	0	0
(5, 8)	(d)=6.5	(l)=4.5	(t)=2.12
(8, 2)	(e)=5.0	(m)=18	(u)=4.24
(8, 5)	(f)=6.5	(n)=4.5	(v)=2.12
(8, 8)	8.0	0	0
Mean of Statistic Values	(g)=5	(o)=6	(w)=1.89
Population Parameter	(h)=5	(p)=6	(x)=2.45

Show how you obtained these values, especially for values in these 9 gray cells. All values computed up to 2D.

Answer: (a) = (2+5)/2 = 3.5, ...

　　　　(g) = (2.0+(a)+(b)+...+8.0) / 9 = 5.0

　　　　(h) = (2+5+8)/3 = 5.0

　　　　(i) = ((2-3.5)^2+(5-3.5)^2)/(2-1) = 4.5 ...

　　　　(o) = (0+(i)+)j)+...+0) / 9 = 6

　　　　(p) = ((2-5)^2+(5-5)^2+(8-5)^2) / 3 = 6

　　　　(q) = (i)^0.5 = 2.12...

　　　　(w) = (0 + (q) + (r) + ... + 0) / 9 = 1.89

　　　　(x) = 6^0.5 = 2.45

2. (10%) Following Problem 1, what is the value for (x) / (w) ? What rule in the Central Limit Theorem helps to explain this ratio? Keep 2D.

Answer: (x) / (w) = 2.45/1.89 = 1.30. This is close to the value of sqrt(2) = 1.41. Central Limit Theorem says that the STD of the sample means would be equal to the population STD divided by the square root of the sample size 2.

3. (30%) Given a normal distribution of a random variable having the population mean of 56.4 and standard deviation of 6.6. Determine the 2-sided 95% confidence interval for a sample size of 10, 25 and 100. Express your confidence interval from a lower bound to an upper bound. Keep 4D for all values.

Answer:
>> mean=56.4; STD=6.6;
>> N=10;
>> mean-1.96*STD/sqrt(N) =   52.3093
>> mean+1.96*STD/sqrt(N) =   60.4907
>> N=25;
>> mean-1.96*STD/sqrt(N) =   53.8128
>> mean+1.96*STD/sqrt(N) =   58.9872
>> N=100;
>> mean-1.96*STD/sqrt(N) =   55.1064
>> mean+1.96*STD/sqrt(N) =   57.6936
>>

4. (30%) Given the body weight for 10 freshmen students as 65.3, 67.5, 54.4, 76.5, 65.4, 82.2, 56.4, 72.2, 66.8, 70.5. (a) What is the SEM for the sample mean body weight of 10 people? (b) Use t-correction (t-distribution) to construct **90%** CI to estimate the mean value for all freshmen students. (c) Use MATLAB's fitdist and paramci to re-compute ad verify your results in (b). (Show details of your steps.)

Answer:
>> X=[65.3, 67.5, 54.4, 76.5, 65.4, 82.2, 56.4, 72.2, 66.8, 70.5]';
>> SEM=std(X)/sqrt(10) =   2.6505

>> mu=sum(X)/10 =   67.7200
>> t=tinv(0.95,9) =   1.8331
>> Lower=mu-t*SEM =   62.8614
>> Upper=mu+t*SEM =   72.5786

>> PD=fitdist(X,'normal');
>> CI=paramci(PD,0.1)
CI =
    62.8614   6.1131
    72.5786   13.7893
>>