Name: Student ID:

BNAD 276. STATISTICAL INFERENCE IN MANAGEMENT

Presession. Summer 2017.

TAKE-HOME QUIZ 3. DUE DATE: 31 MAY 2017

NOTE:

1. There are total 4 questions for a possible total of 10 points.

2. Submit by 1pm Wednesday 31 May 2017 in class.

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1. (2.75pts) Suppose that a random variable X has the following probability density function:

$$f(x) = \frac{1}{25\sqrt{2\pi}} e^{\frac{-1}{2}.\frac{(x-80)^2}{625}}$$

1.1 (.75pt) Calculate P(X ≥ 65) (**at least** 65)

1.2 (1pt) What is equal to $P(14 < X < 83)$? **Choose 2 correct answers** among the followings:

a. $P(X < 83) + P(X < 14)$
b. $P(Z < 0.12) - P(Z < -2.64)$
c. $P(X < 83) - P(X > 14)$
d. $0.5478 + 0.0041$
e. $P(X < 83) + P(X > 14)$
f. $P(X < 83) - P(X < 14)$

1.3 (1pt) Calculate $P(X > 98 \quad or \quad X < 12)$

2. (3.25pts) A sample of 5 months of sales data provided the following information:

Months	Units sold (X)
1	94
2	100
3	85
4	94
5	92

a. (1 pt) Give a consistent point estimate of the population mean number of units sold per month

b. (1 pt) Give a point estimate of the population variance of X. (Hint: you are given a mysterious table below. Check the values in the columns carefully before using them)

Units sold			
94	1	1	1
100	7	49	343
85	-8	64	-512
94	1	1	1
92	-1	1	-1

c. (.5pt) Give a point estimate of the population standard deviation of X.

d. (.75pt) Write down the sampling distribution of the sample mean **(the name of the distribution, the mean and the variance of the distribution)**, assume that the population standard deviation of the number of units sold is 50, the sample size is 5.

3. (2pts) A producer of various kinds of batteries has been producing "S" size. Due to an improved production process, management believes that there has been an increase in the life expectancy of their "S" size batteries. A sample of 20 batteries showed an average life of 36 hours.

3.1. (1pt) Construct a 95% confidence interval for μ, assume that the **population standard deviation** is 9.

3.2. (1 pt) Construct a 90% confidence interval for μ, assume that the **sample standard deviation** is 9. Choose one correct answer among the followings:

a. $\left[36 - 1.960\times\frac{9}{\sqrt{20}};\ 36 + 1.960\times\frac{9}{\sqrt{20}}\right]$

b. $\left[36 - 1.960\times\frac{9}{\sqrt{19}};\ 36 + 1.960\times\frac{9}{\sqrt{19}}\right]$

c. $\left[36 - 1.729\times\frac{9}{\sqrt{20}};\ 36 + 1.729\times\frac{9}{\sqrt{20}}\right]$

d. $\left[36 - 1.729\times\frac{9}{\sqrt{19}};\ 36 + 1.729\times\frac{9}{\sqrt{19}}\right]$

e. $\left[36 - 1.725\times\frac{9}{\sqrt{20}};\ 36 + 1.725\times\frac{9}{\sqrt{20}}\right]$

f. $\left[36 - 1.725\times\frac{9}{\sqrt{19}};\ 36 + 1.725\times\frac{9}{\sqrt{19}}\right]$

4. (2 pts) The president of Doerman Distributors, Inc. believes that 30% of the firm's orders come from first-time customers. A random sample of 100 orders will be used to estimate the proportion of first-time customers.

4.1 (1 pt) Assume that the president is correct and $p = 0.30$. What is the sampling distribution of the sample proportion? Choose one correct answer among the followings:

a. Normal distribution with mean 0.30 and standard deviation $\frac{0.3\times(1-0.3)}{100}$

b. Normal distribution with mean 0.30 and standard deviation $\frac{\sqrt{0.3\times0.7}}{100}$

c. Normal distribution with mean 0.30 and variance $\sqrt{\frac{0.3\times0.7}{100}}$

d. Normal distribution with mean 0.30 and variance $\frac{0.3\times0.7}{100}$

e. Normal distribution with mean 0.30 and variance $\frac{0.3\times(1-0.3)}{\sqrt{100}}$

4.2 (1 pt) What is the probability that the sample proportion will be less than 0.40? Let Z be the standard normal random variable, choose one correct answer among the followings:

a. $P(Z < \frac{0.4-0.3}{\frac{\sqrt{0.3\times0.7}}{100}})$ since N = 100, p = 0.3

b. $P(Z < \frac{0.4-0.3}{0.0458})$

c. $1 - P(Z < \frac{0.4-0.3}{0.0458})$

d. $1 - P(Z < \frac{0.4-0.3}{\sqrt{0.3\times0.7}})$

e. $P(Z < \frac{0.4-0.3}{\frac{0.3\times0.7}{100}})$ since N = 100, p = 0.3