Gulf University for Science & Technology
Department of Economics & Finance

ECON-380: Business Statistics
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Assignment 1

1. A basketball player has the following points for a sample of seven games: 11, 15, 22, 8, 10, 12, 20. Compute the following measures (**show your work**):

a. mean   b. standard deviation

a. The mean = ∑X/n = 98/7 = 14

b. The standard deviation = $\sqrt{variance}$

Variance = ∑(X - X̄)²/ n-1 = 166/6 = $27\frac{2}{3}$

Hence: St. Deviation = $\sqrt{27\frac{2}{3}} = 5.26$

x	x-xbar	(x-xbar)^2
11	-3	9
15	1	1
22	8	64
8	-6	36
10	-4	16
12	-2	4
20	6	36

$\sum = 166$

2. We found the following information for a sample of x and y:
$\sum(x - \bar{x})(y - \bar{y}) = -120$, $\sum(x - \bar{x})^2 = 100$, $\sum(y - \bar{y})^2 = 225$, n = 26
Find the coefficient of correlation (r) and interpret your answer (**show your work**).

$$r = \frac{COV_{X,Y}}{S_Y * S_X}$$

$$COV_{X,Y} = \frac{\sum(x-\bar{x})(y-\bar{y})}{n-1} = \frac{-120}{25} = -4.8$$

$$S_Y = \sqrt{\frac{\sum(y-\bar{y})^2}{n-1}} = \sqrt{\frac{225}{25}} = 3, \qquad S_X = \sqrt{\frac{\sum(x-\bar{x})^2}{n-1}} = \sqrt{\frac{100}{25}} = 2$$

Hence: $r = \frac{-4.8}{3 * 2} = -0.8$ **(strong negative relation)**

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3. If Z is a standard normal random variable, find the value Z_0 for which:

a. $P(Z < Z_0) = 0.35$ *b.* $P(Z > Z_0) = 0.82$

a. $P(Z < Z_0) = 0.35 \rightarrow P(Z_0 < Z < 0) = 0.5 - 0.35 = 0.15$

$Z_0 = -0.39$

b. $P(Z > Z_0) = 0.82 \rightarrow P(Z_0 < Z < 0) = 0.82 - 0.5 = 0.32$

$Z_0 = -0.92$

4. A population has a mean of 50 and variance of 100. If a random sample of 64 is taken, what is the probability that the sample mean is each of the following:

a. at most 52
b. at most 47.5
c. at least 46.8
d. between 48.5 and 52.5
e. between 50.6 and 51.3

a. $P(\overline{X} < 52) = P\left(Z < \frac{52-50}{\frac{10}{\sqrt{64}}}\right) = P(Z < 1.6)$

$= 0.5 + P(0 < Z < 1.6) = 0.5 + 0.4452 = 0.9452$

b. $P(\overline{X} < 47.5) = P\left(Z < \frac{47.5-50}{\frac{10}{\sqrt{64}}}\right) = P(Z < -2)$

$= 0.5 - P(0 < Z < 2) = 0.5 - 0.4772 = 0.0228$

c. $P(\overline{X} > 46.8) = P\left(Z > \frac{46.8-50}{\frac{10}{\sqrt{64}}}\right) = P(Z > -2.56)$

$= 0.5 + P(0 < Z < 2.56) = 0.5 + 0.4948 = 0.9948$

d. $P(48.5 < \overline{X} < 52.5) = P\left(\frac{48.5-50}{\frac{10}{\sqrt{64}}} < Z < \frac{52.5-50}{\frac{10}{\sqrt{64}}}\right) = P(-1.2 < Z < 2)$

$= P(0 < Z < 1.2) + P(0 < Z < 2) = 0.3849 + 0.4772 = 0.8621$

e. $P(50.6 < \overline{X} < 51.3) = P\left(\frac{50.6-50}{\frac{10}{\sqrt{64}}} < Z < \frac{51.3-50}{\frac{10}{\sqrt{64}}}\right) = P(0.48 < Z < 1.04)$

$= P(0 < Z < 1.04) - P(0 < Z < 0.48) = 0.3508 - 0.1844 = 0.1664$

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