Math 480 Quiz 11 Fall 2018 Name____________________

1) Consider the following data set: votes for preseason 1A basketball poll Nov. 22, 2011, WSIL News. Find shorth(3).

[redacted] [redacted] [redacted] [redacted] 76 78 89 111 778

$89 - 76 = 13$

$111 - 78 = 33$

$778 - 89 = 689$

$$\text{shorth}(3) = \boxed{[76, 89]}$$

2) Suppose $X \sim$ Inverse Weibull$(\theta = 100, \tau = 1)$. Simulate two values of x_i from this distribution if $u_1 = 0.69$ and $u_2 = 0.13$. Hint: $x_i = F^{-1}(u_i)$ where $F^{-1}(u) = +\theta[-\log(u)]^{-1/\tau}$.

$$x_i = \theta[-\log u_i]^{-1} = -\theta[\log u_i]^{-1}$$

$$\text{so } x_1 = -100[\log(0.69)]^{-1} = 296.4455$$

$$x_2 = -100[\log(0.13)]^{-1} = 49.0143$$

3) A hospital requires about 40 percent of its surgical patients to seek a second opinion. Find the approximate probability that the hospital will ask at least 18 of its next 50 surgical patients to seek a second opinion. (Hint: Let Y be the number of patients required to seek a second opinion, then Y is binomial$(n = 50, p = 0.4)$. Let X be a normal RV with mean $\mu = np$ and SD $\sigma = \sqrt{np(1-p)}$ and find $P(X \geq 17.5)$.)

$\mu = np = 50(.4) = 20$, $\sigma = \sqrt{np(1-p)} = \sqrt{50(.4)(.6)} = \sqrt{12} = 3.4641$

$P(Y \geq 18) \approx P(X \geq 17.5)$

17.5 20

$z = \frac{17.5-20}{3.4641} = -0.72$

-0.72

$P(Y \geq 18) \approx 1 - P(z \leq -0.72) = 1 - .2358 = \boxed{0.7642}$

$$\begin{array}{c|c} & 02 \\ \hline -0.7 & .2358 \end{array}$$

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4) Suppose $A(t)$ follows an arithmetic Brownian motion with drift $\mu = 5$ and volatility $\sigma = 4$. If $A(5) = 25$, calculate the probability that $A(8) \leq 47$.

Hint: see problem done in class and exam 3 review 90): $W \sim A(t+s)|A(t) \sim N(A(t) + \mu s, \sigma^2 s)$. Here $t = 5$ and $s = 3$. Want $P(W \leq 47)$.

$W \sim N(25 + 5(3), 4^2(3)) \sim N(40, 48)$

40 47

$z = \frac{47-40}{\sqrt{48}} = 1.01$

$P(W \leq 47) \approx P(z \leq 1.01) = \boxed{.8438}$

$$\begin{array}{c|c} & 01 \\ \hline 1.0 & .8438 \end{array}$$

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