Homework 6 **Name:** _____
Biostatistics (STAT:3510; Bognar)

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1. 4.3.5

   (a)

   (c)

   (e)

2. 4.3.8

   (a)

   (b)

3. 4.3.13

   (a)

   (b)

   (c)

4. 4.3.14

5. 4.3.15

6. 4.3.16

7. 4.3.17

   (a)

   (b)

8. A bowl contains 3 chips: the chips labeled 0, 2, and 4. A chip is randomly selected from the bowl. Let X denote the number printed on the chip. The probability mass function (probability distribution) of X is

$$\begin{array}{rccc} x: & 0 & 2 & 4 \\ P(X=x): & \frac{1}{3} & \frac{1}{3} & \frac{1}{3} \end{array}$$

   (a) Find the mean of X, i.e. find $\mu = E(X) = \sum_x xP(X=x)$.

   (b) Find the standard deviation of X, i.e. find $\sigma = SD(X) = \sqrt{\sum_x (x-\mu)^2 P(X=x)}$.

(c) Suppose 2 chips are randomly selected from the bowl *with* replacement. Find the sampling distribution of $\bar{X}$.

(d) Determine the mean of $\bar{X}$, i.e. compute $\mu_{\bar{X}} = E(\bar{X}) = \sum_{\bar{x}} \bar{x} P(\bar{X} = \bar{x})$.

(e) According to the theorem given in class, the mean of $\bar{X}$ is $\mu_{\bar{X}} = E(\bar{X}) = \mu$. Does this hold true when you compare parts (8d) and (8a)?

(f) Determine the standard deviation of $\bar{X}$, i.e. compute $\sigma_{\bar{X}} = SD(\bar{X}) = \sqrt{\sum_{\bar{x}} (\bar{x} - \mu_{\bar{X}})^2 P(\bar{X} = \bar{x})}$.

(g) According to the theorem given in class, the standard deviation of $\bar{X}$ is $\sigma_{\bar{X}} = SD(\bar{X}) = \sigma/\sqrt{n}$. Compute $\sigma/\sqrt{n}$ (remember, we derived σ in part (8b)). Does this equal the result from part (8f)?