ECEN 321 Assignment 1 Joshua Benfell

1 a iii Because it's not targetting ~~as specified~~ as specific of ~~a narrow of a~~ subset of students.
Students in the phone book can be into wildly different things and you're less likely to pick all ~~ta~~ tall basketballers.
Most General representation of ~~a~~ universities student body on that list.

2

~~a Observational Controlled~~ ~~[illegible]~~

~~b Yes because it's a controlled experiment~~
~~was able to split into groups and~~

2 a observational study.
b no, this is only association not definite causation from a study based on a controlled experiment. Researcher didn't influence groups just measured

3a $70000 = \frac{N}{10}$

$N = 700000$

sub 100000 and add 1000000 to show the changed number.

new $N = 700000 + 900000 = 1600000$

$\bar{x} = \frac{1600000}{10}$

$= \$160000$

b $55000

~~c $s = \sqrt{\frac{1}{10-1}\sum_{i=1}^{10}(x_i - \bar{x})^2}$~~

~~$2000 = \sqrt{\frac{1}{9}\sum_{i=1}^{10}(x_i - 70000)^2}$~~

3c $\quad s = 20000$

$$s^2 = \frac{1}{n-1}\sum_{i=1}^{n}(x_i - \bar{x})^2$$

$$= \cancel{\frac{1\left(\sum x_i^2 - n\bar{x}^2\right)}{n-1}}$$

This expansion can be found at https://www.thoughtco.com/sum-of-squares-formula-shortcut-3126266

$$= \frac{\sum_{i=1}^{n} x_i^2 - \frac{1}{n}\left(\sum_{i=1}^{n} x_i\right)^2}{n-1}$$

$$= \frac{\sum_{i=1}^{n} x_i^2 - n\bar{x}^2}{n-1}$$

$$\sum_{i=1}^{n} x_i^2 = s^2(n-1) + n\bar{x}^2$$

orig $\sum_{i=1}^{10} x_i^2 = (20000)^2(9) + 10(\cancel{300}\,70000)^2$

$= 5.26 \times 10^{10}$

new $\sum_{i=1}^{10} x_i^2 = 5.26 \times 10^{10} - (1\times 10^5)^2 + (1\times 10^6)^2$

$= 1.0426 \times 10^{12}$

new $s^2 = \frac{1}{9}\left(1.0426\times 10^{12} - 10 \times 160000^2\right)$

$= 8.74 \times 10^{10}$

$s = \sqrt{8.74 \times 10^{10}}$

$= \$295634.91$

5a ~~{1, 2, 3~~
$\{1, 2, 3\}$

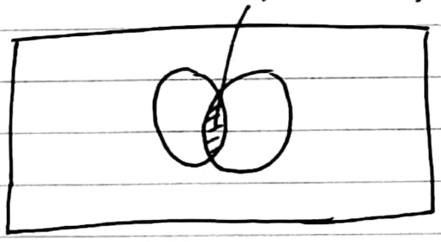
b $P(\text{odd number}) = \frac{4}{6}$
$= \frac{2}{3}$

c no, because there are still the same outcomes of rolling the dice once, just different probabilities.

d yes, 3 has a higher likelihood of showing up over the other faces ~~that~~ which means an odd number is more likely to show up than previously ~~can treat as a 7 sided dice with layout 1, 1, 1, 2, 2, 3, 3~~
(~~probability of landing on 3 is now twice that of landing on the other 5 sides~~)
~~$P(\text{odd}) = 5/7$~~
You have changed odds of landing on an odd number.

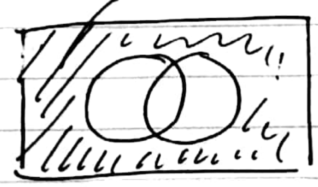
6a $P(V) = 0.15$ $P(V \cup W) = 0.17$
$P(W) = 0.05$

a



$P(V \wedge W) = P(V) + P(W) - P(V \cup W)$
$= 0.15 + 0.05 - 0.17$
$= 0.03$

b $P(\overline{V} \wedge \overline{W}) = 1 - P(V \cup W)$
$= 1 - 0.17$
$= 0.83$



c $P(V \wedge \overline{W}) = P(W \cup V) - P(W)$
$= 0.17 - 0.05$
$= 0.12$