Answers to Extra Math 100 HW on Prob/Stat

Part A

1a) $\sum_{k=1}^{6} k = 1+2+3+4+5+6 = 21$

1b) $\sum_{k=2}^{5} \sqrt{k-1} = \sqrt{1}+\sqrt{2}+\sqrt{3}+\sqrt{4}$

1c) $\sum_{k=5}^{8} k^2-(k-1)^2 = 8^2-4^2$. (More generally, $\sum_{k=r}^{s} k^2-(k-1)^2 = s^2-(r-1)^2$

2) Stem/Leaf:

```
6 | 5
5 |
4 | 022
3 | 1289
2 | 3568999
```

N=15 median=3.1 Q1=2.85 Q3=3.95 IQR=3.95-2.85=1.1 min=2.3 max=6.5

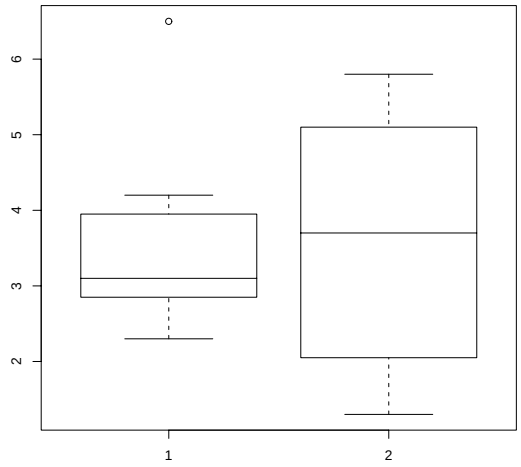
boxplot see below

3) Stem/leaf:

```
5 | 026688
4 | 599
3 | 068
2 | 0166
1 | 3889
```

N=20 median=3.7 Q1=2.05 Q3=5.1 IQR=5.1-2.05=3.05 min=1.3 max=5.8

Boxplots for Problems 2 (left) and 3 (right):



4) $\bar{x} = 2, s^2 = 20$:

Part B

1a) Mean= $\frac{3}{4}$, Variance=$(-2-.75)^2/4+(1-.75)^2/2+(3-.75)^2/4 = 3.1875$

1b) $A = 1-(.1+.1+.2+.2+.1) = .3$, Mean=$0*.1+1*.1+2*.2+3*.2+4*.1+5*.3 = 3$, Variance=$(0-3)^2*.1+(1-3)^2*.1+(2-3)^2*.2+(3-3)^2*.2+(4-3)^2*.1+(5-3)^2*.3 = 2.8$

2) $E(X) = 0.25 \times 72 = 18$

3) If Y =winnings, then $Y = 5X+(-1)(72-X)$ (why?), so $E(Y) = E(5X-72+X) = 5E(X)-72+E(X) = 5*18-72+18 = 36$ dollars.

4) $E(X^3) = (\frac{1}{6})1^3+(\frac{1}{6})2^3+(\frac{1}{6})3^3+(\frac{1}{6})4^3+(\frac{1}{6})5^3+(\frac{1}{6})6^3 = \frac{441}{6} = 73.5$

5) Probability of a 5 or 6 is $\frac{1}{3}$, so expected number of successes $36/3 = 12$.

6a) $\sigma_X = 2, \sigma_Y = 1, \sigma_Z = 3$

6b) $E(X+Y) = E(X)+E(Y) = 1-2 = -1$, $E(5Y) = 5E(Y) = -10$, $E(2X+Y+2Z) = 2E(X)+E(Y)+2E(Z) = 2-2+6 = 6$, and $E(X-Y) = E(X)-E(Y) = 1-(-2) = 3$. $Var(X+Y) = Var(X)+Var(Y) = 5$, Std.Dev= $\sqrt{5}$, $Var(5Y) = 25Var(Y) = 25$, Std.Dev= $\sqrt{25} = 5$, $Var(2X+Y+2Z) = 4Var(X)+Var(Y)+4Var(Z) = 16+1+36 = 53$, Std.Dev= $\sqrt{53}$, and $Var(X-Y) = Var(X)+Var(Y) = 4+1 = 5$, Std.Dev= $\sqrt{5}$.

7) NOTE TYPO; problem should have started: "In a class of 49 students, the heights $x_1, x_2, \ldots, x_4 9$" $\bar{x} = 68, s^2 = 4$.

7a) 95% confidence interval for the height is $\bar{x} \pm z_{[}.025]\frac{s}{\sqrt{49}} = 68 \pm (1.96)\frac{2}{7}$

7b) 99% confidence interval for the height is $\bar{x} \pm z_{[}.005]\frac{s}{\sqrt{49}} = 68 \pm (2.58)\frac{2}{7}$

8) THIS PROBLEM IS AN ERROR - I gave no measured value, so you can't compute a confidence interval! Try again, with a measured value of 25 heads out of 72 flips.

9) 1/2