Name: KEY

Math 1040-001
Quiz 5
April 4, 2016

1. (10 points) The table below gives the results of a survey given to 100 college seniors asking them how many chidren they plan to have. Fill out the rest of the table, and find the expected value (mean) and standard deviation.

x	Frequency	$P(x)$	$x - \mu$	$(x-\mu)^2 P(x)$
0	40	.4	-1	.4
1	25	.25	0	0
2	30	.3	1	.3
3	5	.05	2	.2

Expected Value $= \mu = 0 \cdot (.4) + 1 \cdot (.25) + 2 \cdot (.3) + 3 \cdot (.05) = 1$

Standard Deviation $= \sigma = \sqrt{.4 + 0 + .3 + .2} = \sqrt{.9} \approx 0.95$

Turn Over the Quiz
There is a Second Page!

2. (10 points) You will need the three formulas below about the discrete probability distribution coming from a *binomial experiment* with:

$$n = \text{the number of trials}$$
$$p = \text{probability of success}$$
$$q = \text{probability of failure}$$

The formulas you need are:

$$P(x) = {}_nC_x p^x q^{n-x}$$

$$\mu = np$$

$$\sigma = \sqrt{npq}$$

So here is the problem:

You are given a trick coin that has probability:

$p = 0.6$ (of coming up heads) and $q = 0.4$ (of coming up tails)

You flip the coin 5 times:

(a) What is the probability of getting 3 heads? (Hint: ${}_5C_3 = 10$)

$$10 \cdot (.6)^3 \cdot (.4)^2 \approx 0.35$$

(b) What is the expected number of heads μ of the 5 coin flips?

$$5 \cdot .6 = 3$$

(c) What is the standard deviation σ?

$$\sqrt{5 \cdot .6 \cdot .4} \approx 1.1$$

(d) Is it unusual to get all heads? All tails? (Explain your answer)

$$\mu + 2\sigma = 3 + 2.2 = 5.2$$
$$\mu - 2\sigma = 3 - 2.2 = 0.8$$

It is not unusual to get all heads because 5 is not greater than 5.2
It is unusual to get all tails because $0 < 0.8$