MAT 223, Discussion Questions 10.21

1. What are the properties of the binomial distribution?

Success or failure
fixed # of trials
fixed probability

2. What are some situations we can use the binomial distribution to model? Give at least three.

coin flips, gender of children, dice rolls
agree/disagree questions

Answers will vary

3. The formula for the binomial distribution is given by $P(X = x) = \binom{n}{x} p^x (1-p)^{n-x}$. What do p, n, and x stand for?

p is the probability of success on each trial
n is the # of trials
X is the # of successes

4. For the scenario in which we flip 5 fair coins and count the number of heads, state the probability distribution in the table below.

X=

# of Heads	0	1	2	3	4	5
$p(x)$	1/32	5/32	5/16	5/16	5/32	1/32
	.03125	.15625	.3125	.3125	.15625	.03125

p=1/2, n=5, binomialpdf(5, 1/2, x)

5. Give the cumulative distribution for the above scenario in the table below.

X=

# of Heads	0	1	2	3	4	5
$p(x)$	1/32	3/16	1/2	13/16	31/32	1
	.03125	.1875	.5	.8125	.96875	1.00

p=1/2, n=5 binomialcdf(5, 1/2, x)

6. How does the distribution change if we are rolling 5 dice and counting the number of 4s? You can round your answers to 4 decimal places.

X= # of ~~Heads~~ 4's	0	1	2	3	4	5
$p(x)$	.4019	.4018	.1608	.0322	.0032	1.286×10^{-4}

$p = 1/6$, $n = 5$

binomialpdf(5, 1/6, x)

7. Suppose that 90% of all batteries from a certain factory have acceptable voltages. A certain type of flashlight requires two D batteries, and the flashlight will work only if both batteries have acceptable voltages. Among ten randomly selected flashlights, what is the probability that that at least nine will work?

$p = .9 * .9 = .81$

0 1 2 3 4 5 6 7 8 9 10

(9 and 10: at least 9)

1 − binomialcdf(10, .81, 8) = .406756

or binomialpdf(10, .81, 9) + binomialpdf(10, .81, 10)

40.7%

8. In light of the argument at http://profkeithdevlin.org/2011/11/20/what-is-algebra/, what aspects of our course so far are "algebra" and which are more like "arithmetic"? Do you think we have a misperception about algebra or that the author of the article is just wrong?