

## Worksheet – Sections 6.3

**Binomial experiment:** an experiment that repeats the same independent and identical trial multiple times, with each trial resulting in either *success* or *failure*, and counts the number of successes.

**Binomial distribution:** the probability distribution of the number of successes a binomial experiment. It is completely determined by the number of trials  $n$  and the probability of success  $p$  per trial.

**Mean (expected number of successes):**  $\mu = np$

**Standard deviation:**  $\sigma = \sqrt{np(1-p)}$

**Approximation:** a binomial distribution is well-approximated by a normal distribution if  $np > 10$  and  $n(1-p) > 10$ .

**StatCrunch:** Stat → Calculators → Binomial

1) Determine if each of the following experiments is a binomial experiment. If so, find  $n$  and  $p$ .

(a) Toss a fair coin 12 times and record the number of Tails.

(b) Roll a dice 10 times and count the number of times 6 appears.

(c) Roll a dice 40 times and count the number of times you get either 1 or 5.

(d) Keep tossing a fair coin and record the number of tosses it takes to get the first Head.

(e) A basketball player has a 75% free-throw success rate. During practice, he/she shoots 20 free throws and counts the number of successful shots.

(f) You draw 5 cards at once from a standard deck without replacement and count the number of Queen cards in your hand.

(g) You draw a card from a standard deck, record whether it is a Queen, then put the card back and shuffle the deck before drawing again. This process is repeated 5 times, and you count the number of Queens drawn.

(h) You toss an unfair coin 3 times and count the number of Heads. Suppose  $P(H) = 0.6$ ,  $P(T) = 0.4$ .

2) In Problem 1 (h), make a table of probability distribution.

3) In Problem 1 (a), use StatCrunch to find the following:

(a) the probability that you get exactly 3 Tails.

(b) the probability that you get at least 3 Tails.

(c) the probability that you get at most 5 Heads.

(d) the probability that you get no more than 4 Tails.

(e) the probability that you get between 3 and 6 Tails.

(f) the probability that you get between 3 and 6 Tails.

4) In Problem 1 (c),

(a) Find the mean and standard deviation.

(b) Can this binomial distribution be well-approximated by a normal distribution?

(c) According to the Empirical Rule, about 95% of all rolls, the number of times you get either 1 or 5 is between \_\_\_\_\_ and \_\_\_\_\_. Round to the nearest whole numbers.