

**Topics no longer included in Math 141 are marked through**

**PROBABILITY DISTRIBUTIONS AND STATISTICS**

1. An experiment consists of choosing a sample of 3 marbles from a jar that contains 3 blue and 4 green marbles. Let  $X$  be the number of blue marbles in the sample.
  - (a) Find the probability distribution table for the number of blue marbles in the sample.
  - (b) Draw the probability histogram for the number of blue marbles in the sample.
  - (c) What is the expected number of blue marbles in the sample?
  - (d) Find the range, mean, median, mode and standard deviation for the number of blue marbles in the sample.

2. A diamond ring is insured for \$3000. The annual premium is \$110 and there is a 0.5% chance that the ring will need to be replaced in a year. What is the insurance company's expected gain?

3. You play a game where you get \$50 if you have exactly two kings when dealt 4 cards. What is should be charged play this game if it is a fair game (expected value is 0)?

4. From a bush bearing a new kind of starfruit a sample of fruit is chosen and the number of seeds in each fruit is counted. The table below shows the results of this experiment:

Number of starfruit	12	11	10	9	8	7	6
Number of seeds	0	4	6	10	11	12	15

Find the mean, median, mode, standard deviation, range and IQR of this data.

5. A new medicine is effective in 70% of the people who take it. If 10 of your patients are given this medicine,

- (a) Find the probability distribution table for the number of patients that find it effective.
- (b) What is the expected number of patients that find it effective? What is the standard deviation?

~~If 1000 patients are given this medicine, use the normal curve approximation to the binomial distribution to find the probability that~~

- ~~(c) more than 710 patients find the medicine effective.~~
- ~~(d) Fewer than 685 patients find the medicine effective.~~
- ~~(e) between 680 and 720 patients find the medicine effective.~~

6. Given that  $X$  is a normal random variable with  $\Phi=50$  and  $\sigma=5$ ,

- a) Find  $P(X>57)$
- b) Find  $P(35<X<45)$
- c) Find  $P(X<40)$
- d) Find a value  $c$  such that  $P(X<c) = 0.4$
- e) Find a value  $c$  such that  $P(X>c) = 0.7$
- f) Find a value  $c$  such that  $P(50-c<X<50+c) = 0.20$