

MA395 Takehome Quiz 1

**Name:**

1) A baseball player is said to be a "300 hitter" if he has a 30% chance of hitting safely each time he bats. If a 300 hitter bats 4 times in a certain game, find the probabilities of getting  $n$  hits, for  $n \in \{0, 1, 2, 3, 4\}$ .

2) Two fair dice are rolled. Suppose a random variable  $X$  is defined to be the *product* of the two faces that come up.

a) Write a table that shows the values  $X$  can assume and the outcomes that produce each of those values (i.e., construct a table that defines  $X$  as a function from the sample space into the subset of the real numbers that contains all possible outcomes).

b) Assuming that all 36 possible outcomes are equally likely, find the probability distribution  $f(X)$ .

3) A squirrel born in a certain year has a 15% chance of surviving to breed the following year. What size litter is necessary to make the probability that one or more offspring survive to breed at least  $2/3$ ?

4) The bluejay population in a certain county is estimated to be 4500. A sample indicates that 10% are infected with the West Nile virus. If there are  $n$  bluejays in a certain field, write a formula for the probability that  $k$  of them are infected with the West Nile virus.

5) A burglar removes 4 gems at random from a display case that contains 10 real and 25 fake diamonds. What is the probability that the last gem removed is the second real diamond in the set of four that were removed?