

**Homework 8 - Math 421**

Name: \_\_\_\_\_

Due Friday, October 20. Be sure to show any work you needed to do. You can use a calculator or computer, but give exact (not decimal) answers when possible.

1. A six-side die is loaded so that it has the following probability distribution:

Outcome	1	2	3	4	5	6
Probability	0.1	0.15	0.15	0.15	0.15	0.30

Let  $X$  be the total if you roll this die five times. Find  $P(X = 20)$ .

2. Gerolamo Cardano was one of the first mathematicians to study probability. He described a carnival game where there are six dice. Each of the dice has five blank sides. The sixth side has a number between 1 and 6, a different number on each die. Use generating functions to find the probability distribution for the total  $X$  if all six dice are rolled. Then answer the following questions:

(a) What is the expected value and variance of  $X$ ?

(b) Find  $P(X \geq 16)$ .

(c) Suppose that  $X \geq 16$ . Find the conditional PMF for  $X$ , i.e., draw a bar graph showing

$$P(X = k | X \geq 16)$$

for each possible value of  $k$ .