STAT/MA 41600
In-Class Problem Set #7: September 5, 2018

1. Let X denote the height, in centimeters, of a randomly selected student. Let Y denote the student's GPA, rounded up to the nearest integer, e.g., the GPA 3.7 rounds up to 4. Let Z denote the height, in centimeters, of the student's best friend.
1a. Is X a discrete or continuous random variable? (If neither, then why?)
1b. Is Y a discrete or continuous random variable? (If neither, then why?)
1c. Is (X, Z) a discrete or continuous random variable? (If neither, then why?)
1d. Is $X + Z$ a discrete or continuous random variable? (If neither, then why?)

2. Consider a collection of six bears of different colors. Mary likes purple and orange bears. When she reaches into her collection and finds a purple or orange bear, she notes the color and just replaces the selected bear back into the collection. On the other hand, if she finds a bear that is not purple or orange, she throws it away forever.

Suppose Mary does this procedure 3 times (without replacement when she discards bears), and let X denote the number of times that she selects a bear that is purple or orange.
2a. Find $P(X = 0)$. **2b.** Find $P(X = 1)$. **2c.** Find $P(X = 2)$. **2d.** Find $P(X = 3)$.

3. Rafael repeatedly selects cards from the deck, according to the following scheme: If he chooses a Jack, Queen, or King, then he removes it from the deck, along with all of the other Jacks, Queens, and Kings. Otherwise, he just puts the selected card back into the deck, without modifying the deck.

Rafael continues this process until he gets the first Jack, Queen, or King, and then he stops afterward.

Let X denote the number of draws that Rafael makes altogether. **3a.** Find $P(X \geq 3)$. **3b.** Find $P(X \geq 10)$. **3c.** Find $P(X \geq 100)$. **3d.** For n a positive integer, find $P(X \geq n)$.

4. Roll three 4-sided dice. Let X denote the minimum of the values that appear.
4a. Find $P(X = 1)$. **4b.** Find $P(X = 2)$. **4c.** Find $P(X = 3)$. **4d.** Find $P(X = 4)$.