# Review of Random Variables

1.  Determine if the following are **discrete** or **continuous** random variables.

a.)  X = The number of sales calls a salesperson makes in a day

b.)  Y = The amount of time a salesperson spends on the phone in a day

c.)  Z = The volume of bottled water in a 32-ounce container

d.)  A = The number of stocks in the Dow Jones Industrial Average that increased on a given day

e.)  B = The number of home runs hit during a baseball game

f.)  C = The length of time it takes to complete a test

2.  Determine if each of the following represents a **probability distribution**.  If not, explain why not.

a.)

| Days of Rain | 0 | 1 | 2 | 3 |
|---|---|---|---|---|
| Probability | 0.216 | 0.432 | 0.288 | 0.064 |

b.)

| Y | 0 | 1 | 2 | 3 |
|---|---|---|---|---|
| P(Y) | 0.2 | 0.4 | -0.1 | 0.5 |

c.)

| Z | -4 | -3 | -2 | -1 |
|---|---|---|---|---|
| P(Z) | 0.1 | 0.2 | 0.3 | 0.4 |

3. On the 2008 A.P. Statistics exam, DHS students had the following score distribution:

| Score | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Frequency | 3 | 11 | 21 | 8 | 8 |

a.)  Add a row to the table containing the probability of each outcome.

b.)  What is the probability a DHS student "passed" the exam (scored a 3 or higher)?

c.)  What is the probability a DHS student scored a 2 through 4 inclusive?

d.)  Nationwide, 40.7% of students did not pass the exam.  Compare DHS's results to this.

e.) Find the mean, variance, standard deviation, and expected value of the scores.  Show work!

4. A game of chance at a casino involves rolling three dice. It costs $10 to play. If all the dice land on 6, the player wins $1,500.

   a.) Create the probability distribution for X = the net amount of money won.

   b.) How much would you expect to win in this game?

   c.) What is the standard deviation of X, and what does it measure?

   d.) Use the law of large numbers to make a statement about why the casino likes this game.

5. Suppose X and Y are random variables with $\mu_X = 15, \sigma^2_X = 9$
   $\mu_Y = 12, \sigma^2_Y = 4$.

   Find the mean and standard deviation of the following random variables…

   a.) $3X - 5$

   b.) $\dfrac{Y + 20}{2}$

6. Suppose X and Y are independent random variables with $\mu_X = 20, \sigma_X = 2.5$
   $\mu_Y = 13, \sigma_Y = 3.1$.

   Find the mean and standard deviation of the following random variables…

   a.) $X + Y$

   b.) $X - Y$

   c.) $0.6X + 1.7Y$

   d.) $4X - 9Y$

7. Refer to question 6. Assume X and Y are independent and normally distributed.
   a.) Find the probability that X is greater than Y.

   b.) Find the probability that Y is greater than X.