MAT 223, Discussion Questions 10.19

1. Give three examples of discrete random variables.

Coin flips, dice rolls, approve/not approve questions
# of children in a family

answers will vary

2. What is a probability distribution? Give an example of the distribution for the number of heads in two coin flips. (Discrete probability distributions are usually given in a table. The discussion questions from 9.04 had the distribution for number of heads in 4 coins flips. You can use that as a model.)

# of heads	2	1	0
prob	¼	½	¼

HH 2 heads
HT } 1 head
TH
TT 0 heads

3. Choose a student at random from all who took MAT 135 in recent years. The probabilities for the student's grade are

Grade:	A	B	C	D	F
Probability:	0.2	0.4	0.2	0.1	? ← 0.1

a. Fill in the probability of receiving an F.   .2+.4+.2+.1= .9   1-.9=.1

b. Convert the letter grades to GPA (A=4, B=3, C=2, D=1, F=0), and use that information to calculated the expected grade for a student in this class.

GPA	4	3	2	1	0
prob	.2	.4	.2	.1	.1

4(.2) + 3(.4) + 2(.2) + 1(.1) + 0(.1)
= 2.5
B/C

c. Interpret the value you get in the context of the problem.

if we collect grades for a class of 135 student, we can expected them to average between a B & C,

4. In a raffle, 250 tickets are sold. The top prize is $1000. The second prize is $200. The third prize is $50. There are 4 fourth prizes worth $10 each. It costs $10 to purchase a ticket. Complete the table below and use it to calculate the expected value of purchasing a raffle ticket.

	1st prize	2nd prize	3rd prize	4th prize	Win nothing
Value of Event (Winnings - $10 to play)	$1000 - 10$ $= 990$	$200 - 10$ $= 190$	$50 - 10$ $= 40$	$10 - 10$ $= 0$	-10
Probability of Event	$1/250$	$1/250$	$1/250$	$4/250$	$243/250$

$$990(1/250) + 190(1/250) + 40(1/250) + 0(4/250) - 10(243/250) = \$ -4.84$$

5. Explain how to calculate (the steps needed to calculate) a variance (or standard deviation) by hand for a discrete probability distribution.

find the mean. Subtract the mean from each value in the destrib. Square. Multiply the values obtained by the probability associated with each. add up. (for Standard deviation, take the square root last)

OR

find the mean. Square. Set aside.
Square each value then multiply by the associated probability. add up.

Subtract the square of the mean. (for st.dev, take the square root)

6. Use this process to find the standard deviation of the distribution above in #2. Is it what you expected?

$$\left(\$990\right)^2 (1/250) + \left(190\right)^2 (1/250) + \left(40\right)^2 (1/250) + 0^2 (4/250) + \left(10\right)^2 \left(\frac{243}{250}\right)$$

$$4168.4 - (4.84)^2 = 4144.9744 = \sigma^2$$

$$\sigma = 64.38$$

Or use 1VarStats L_1, L_2 in Calculator

7. How do we find the standard deviation in the calculator? What about the variance?

1 Var Stats L_1, L_2
     ↑   ↑
  values frequency/probability

σ_x is the standard deviation

to find variance, square this value

8. Read this article at http://georgecouros.ca/blog/archives/5432. What do you want to learn, solve or create from this class?