

MAT 135, Discussion Questions 3.21

1. Give three examples of discrete random variables.

How many coins come up tails
 the number of dice rolled w/ odd faces
 the number of students in a class w/ A's

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 1.29 had the distribution for number of heads in 4 coins flips. You can use that as a model.)

# of heads	0	1	2
Probability	1/4	2/4 = 1/2	1/4

HH, HT, TH, TT

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

	4	3	2	1	0
Grade:	A	B	C	D	F
Probability:	0.2	0.4	0.2	0.1	? $\Rightarrow 0.1$

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

$$4(.2) + 3(.4) + 2(.2) + 1(.1) + 0(.1) = 0.8 + 1.2 + .4 + .1 + 0 = \boxed{2.5}$$

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

in terms of \pm grades this is midway between B- and C+
 we should expect that a random group of students should have a GPA around here (2.5)

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.

	1 st prize	2 nd prize	3 rd prize	4 th prize	Win nothing
Value of Event (Winnings - \$10 to play)	1000 - 10 = 990	200 - 10 = 190	50 - 10 = 40	10 - 10 = 0	0 - 10 = -10
Probability of Event	$\frac{1}{250}$	$\frac{1}{250}$	$\frac{1}{250}$	$\frac{4}{250}$	$\frac{1-\frac{7}{250}}{250} = \frac{243}{250}$

$$990\left(\frac{1}{250}\right) + 190\left(\frac{1}{250}\right) + 40\left(\frac{1}{250}\right) + 0\left(\frac{4}{250}\right) - 10\left(\frac{243}{250}\right) =$$

$$= -4.84$$

expect to lose \$4.84 on average per ticket purchased

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

for variance method 1: find mean. Subtract from each outcome. Square these values. multiply by corresponding probabilities. Add up.

there is a second method also.

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

you can use calculator. put outcomes in L1. put probabilities in L2. Run $\boxed{\text{1VarStats L1, L2}}$ (frequency), Read $\sigma_x =$

$$\sigma_x = \sqrt{.5} \text{ or } \sigma_x = .7071$$

$\frac{1}{2}$ $\frac{1}{\sqrt{2}}$

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

See above.

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