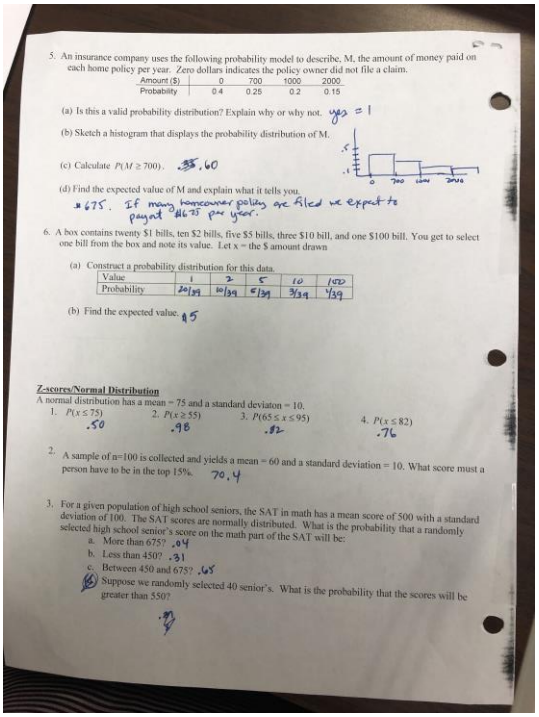


5. An insurance company uses the following probability model to describe, M, the amount of money paid on each home policy per year. Zero dollars indicates the policy owner did not file a claim.

Amount ($)	0	700	1000	2000
Probability	0.4	0.25	0.2	0.15

(a) Is this a valid probability distribution? Explain why or why not. yes = 1

(b) Sketch a histogram that displays the probability distribution of M.

(c) Calculate $P(M \geq 700)$. .35, .60

(d) Find the expected value of M and explain what it tells you.
$675. If many homeowner policies are filed we expect to payout $675 per year.

6. A box contains twenty $1 bills, ten $2 bills, five $5 bills, three $10 bill, and one $100 bill. You get to select one bill from the box and note its value. Let x = the $ amount drawn

(a) Construct a probability distribution for this data.

Value	1	2	5	10	100
Probability	20/39	10/39	5/39	3/39	1/39

(b) Find the expected value. $5

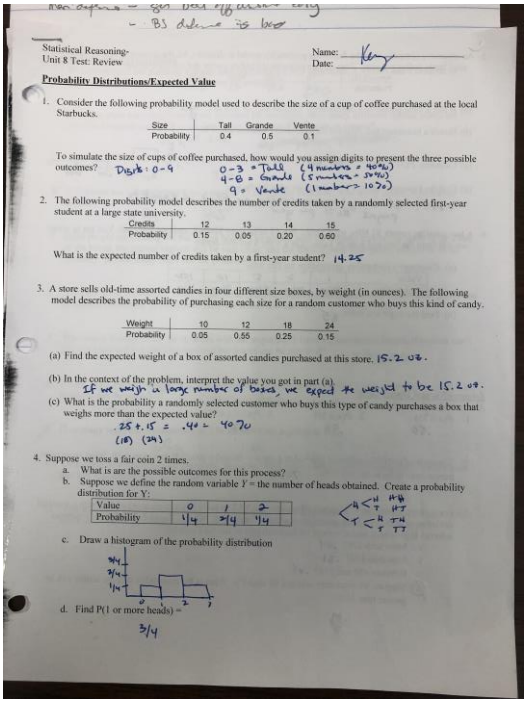
Z-scores/Normal Distribution

A normal distribution has a mean = 75 and a standard deviaton = 10.

1. $P(x \leq 75)$ .50
2. $P(x \geq 55)$ .98
3. $P(65 \leq x \leq 95)$ .82
4. $P(x \leq 82)$ .76

2. A sample of n=100 is collected and yields a mean = 60 and a standard deviation = 10. What score must a person have to be in the top 15%. 70.4

3. For a given population of high school seniors, the SAT in math has a mean score of 500 with a standard deviation of 100. The SAT scores are normally distributed. What is the probability that a randomly selected high school senior's score on the math part of the SAT will be:
   a. More than 675? .04
   b. Less than 450? .31
   c. Between 450 and 675? .65
   d. Suppose we randomly selected 40 senior's. What is the probability that the scores will be greater than 550?



Statistical Reasoning-
Unit 8 Test: Review

Name: Key
Date:

Probability Distributions/Expected Value

1. Consider the following probability model used to describe the size of a cup of coffee purchased at the local Starbucks.

Size	Tall	Grande	Vente
Probability	0.4	0.5	0.1

To simulate the size of cups of coffee purchased, how would you assign digits to present the three possible outcomes? Digits: 0-9
0-3 = Tall (4 numbers = 40%)
4-8 = Grande (5 numbers = 50%)
9 = Vente (1 number = 10%)

2. The following probability model describes the number of credits taken by a randomly selected first-year student at a large state university.

Credits	12	13	14	15
Probability	0.15	0.05	0.20	0.60

What is the expected number of credits taken by a first-year student? 14.25

3. A store sells old-time assorted candies in four different size boxes, by weight (in ounces). The following model describes the probability of purchasing each size for a random customer who buys this kind of candy.

Weight	10	12	18	24
Probability	0.05	0.55	0.25	0.15

(a) Find the expected weight of a box of assorted candies purchased at this store. 15.2 oz.

(b) In the context of the problem, interpret the value you got in part (a).
If we weigh a large number of boxes, we expect the weight to be 15.2 oz.

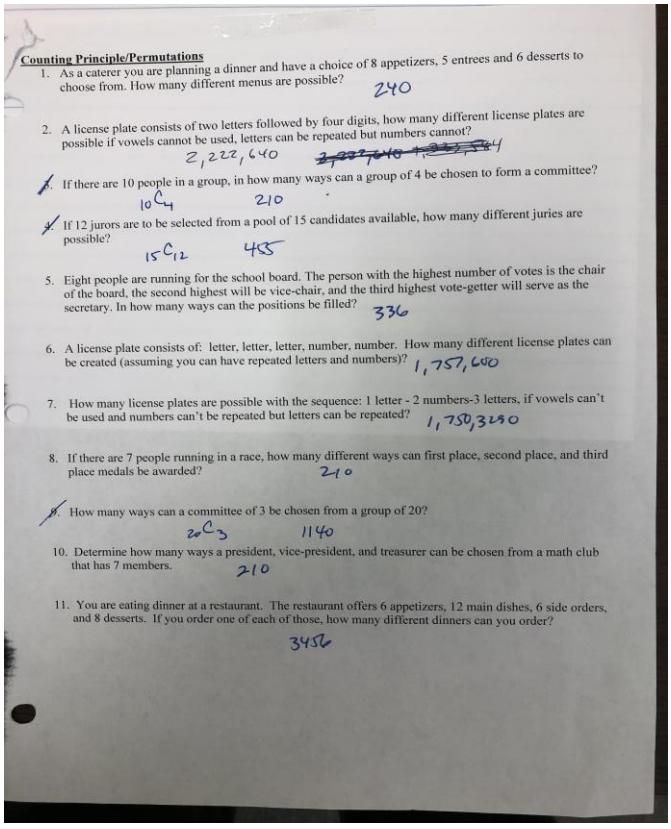
(c) What is the probability a randomly selected customer who buys this type of candy purchases a box that weighs more than the expected value?
.25 + .15 = .40 = 40%
(10) (24)

4. Suppose we toss a fair coin 2 times.
   a. What is are the possible outcomes for this process?
   b. Suppose we define the random variable Y = the number of heads obtained. Create a probability distribution for Y:

Value	0	1	2
Probability	1/4	2/4	1/4

   c. Draw a histogram of the probability distribution

   d. Find P(1 or more heads) = 3/4



Counting Principle/Permutations

1. As a caterer you are planning a dinner and have a choice of 8 appetizers, 5 entrees and 6 desserts to choose from. How many different menus are possible? 240

2. A license plate consists of two letters followed by four digits, how many different license plates are possible if vowels cannot be used, letters can be repeated but numbers cannot? 2,222,640

3. If there are 10 people in a group, in how many ways can a group of 4 be chosen to form a committee? $_{10}C_4$ 210

4. If 12 jurors are to be selected from a pool of 15 candidates available, how many different juries are possible? $_{15}C_{12}$ 455

5. Eight people are running for the school board. The person with the highest number of votes is the chair of the board, the second highest will be vice-chair, and the third highest vote-getter will serve as the secretary. In how many ways can the positions be filled? 336

6. A license plate consists of: letter, letter, letter, number, number. How many different license plates can be created (assuming you can have repeated letters and numbers)? 1,757,600

7. How many license plates are possible with the sequence: 1 letter - 2 numbers-3 letters, if vowels can't be used and numbers can't be repeated but letters can be repeated? 1,750,3250

8. If there are 7 people running in a race, how many different ways can first place, second place, and third place medals be awarded? 210

9. How many ways can a committee of 3 be chosen from a group of 20? $_{20}C_3$ 1140

10. Determine how many ways a president, vice-president, and treasurer can be chosen from a math club that has 7 members. 210

11. You are eating dinner at a restaurant. The restaurant offers 6 appetizers, 12 main dishes, 6 side orders, and 8 desserts. If you order one of each of those, how many different dinners can you order? 3456