

Name: _____ Hour: _____ Date: _____

Unit 4: Probability, Random Variables, Probability Distributions

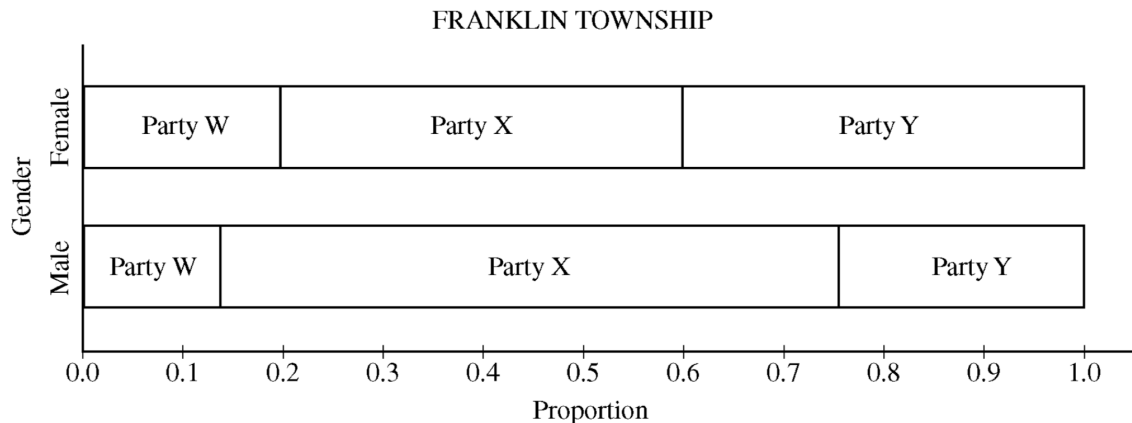
2011 #2: Political party registration

The table below shows the political party registration by gender of all 500 registered voters in Franklin Township.

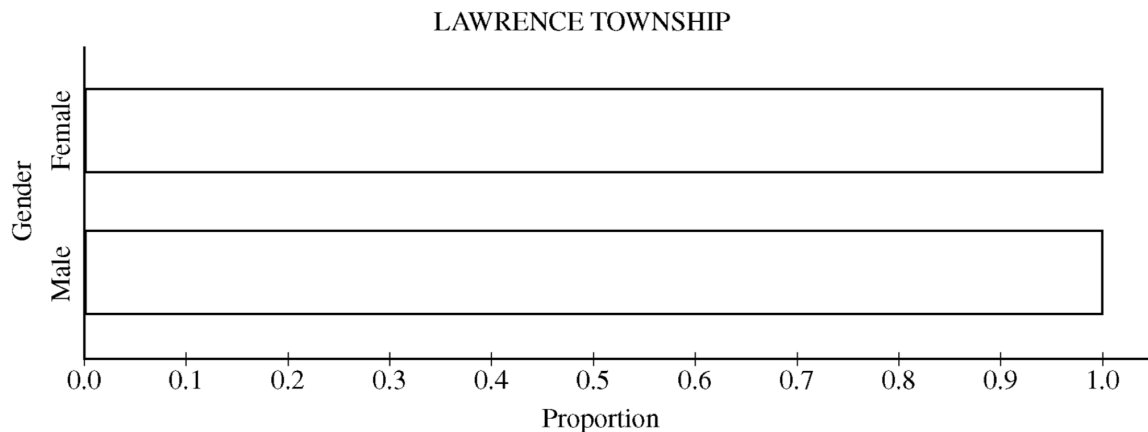
PARTY REGISTRATION–FRANKLIN TOWNSHIP

	Party W	Party X	Party Y	Total
Female	60	120	120	300
Male	28	124	48	200
Total	88	244	168	500

- (a) Given that a randomly selected registered voter is a male, what is the probability that he is registered for Party Y?
- (b) Among the registered voters of Franklin Township, are the events “is a male” and “is registered for Party Y” independent? Justify your answer based on probabilities calculated from the table above.
- (c) One way to display the data in the table is to use a segmented bar graph. The following segmented bar graph, constructed from the data in the party registration–Franklin Township table, shows party-registration distributions for males and females in Franklin Township.



In Lawrence Township, the proportions of all registered voters for Parties W, X, and Y are the same as for Franklin Township, and party registration is independent of gender. Complete the graph below to show the distributions of party registration by gender in Lawrence Township.



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2008 #3: Arcade game

A local arcade is hosting a tournament in which contestants play an arcade game with possible scores ranging from 0 to 20. The arcade has set up multiple game tables so that all contestants can play the game at the same time; thus contestant scores are independent. Each contestant's score will be recorded as he or she finishes, and the contestant with the highest score is the winner.

After practicing the game many times, Josephine, one of the contestants, has established the probability distribution of her scores, shown in the table below.

Josephine's Distribution				
Score	16	17	18	19
Probability	0.10	0.30	0.40	0.20

Crystal, another contestant, has also practiced many times. The probability distribution for her scores is shown in the table below.

Crystal's Distribution			
Score	17	18	19
Probability	0.45	0.40	0.15

- (a) Calculate the expected score for each player.
- (b) Suppose that Josephine scores 16 and Crystal scores 17. The difference (Josephine minus Crystal) of their scores is -1 . List all combinations of possible scores for Josephine and Crystal that will produce a difference (Josephine minus Crystal) of -1 , and calculate the probability for each combination.
- (c) Find the probability that the difference (Josephine minus Crystal) in their scores is -1 .
- (d) The table below lists all the possible differences in the scores between Josephine and Crystal and some associated probabilities.

Distribution (Josephine minus Crystal)						
Difference	-3	-2	-1	0	1	2
Probability	0.015			0.325	0.260	0.090

Complete the table and calculate the probability that Crystal's score will be higher than Josephine's score.

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Unit 5: Sampling Distributions

2014 #3: Sick days

Schools in a certain state receive funding based on the number of students who attend the school. To determine the number of students who attend a school, one school day is selected at random and the number of students in attendance that day is counted and used for funding purposes. The daily number of absences at High School A in the state is approximately normally distributed with mean of 120 students and standard deviation of 10.5 students.

- (a) If more than 140 students are absent on the day the attendance count is taken for funding purposes, the school will lose some of its state funding in the subsequent year. Approximately what is the probability that High School A will lose some state funding?
- (b) The principals' association in the state suggests that instead of choosing one day at random, the state should choose 3 days at random. With the suggested plan, High School A would lose some of its state funding in the subsequent year if the mean number of students absent for the 3 days is greater than 140. Would High School A be more likely, less likely, or equally likely to lose funding using the suggested plan compared to the plan described in part (a)? Justify your choice.
- (c) A typical school week consists of the days Monday, Tuesday, Wednesday, Thursday, and Friday. The principal at High School A believes that the number of absences tends to be greater on Mondays and Fridays, and there is concern that the school will lose state funding if the attendance count occurs on a Monday or Friday. If one school day is chosen at random from each of 3 typical school weeks, what is the probability that none of the 3 days chosen is a Tuesday, Wednesday, or Thursday?

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Homework (AP Classroom)

Based on records kept at a gas station, the distribution of gallons of gas purchased by customers is skewed to the right with mean 10 gallons and standard deviation 4 gallons. A random sample of 64 customer receipts was selected, and the sample mean number of gallons was recorded. Suppose the process of selecting a random sample of 64 receipts and recording the sample mean number of gallons was repeated for a total of 100 samples. Which of the following is the best description of a dotplot created from the 100 sample means?

- ☐ **A** The dotplot is skewed to the right with mean 10 gallons and standard deviation 4 gallons.
- ☐ **B** The dotplot is skewed to the right with mean 10 gallons and standard deviation 0.5 gallon.
- ☐ **C** The dotplot is skewed to the right with mean 10 gallons and standard deviation 0.4 gallon.
- ☐ **D** The dotplot is approximately normal with mean 10 gallons and standard deviation 0.5 gallon.
- ☐ **E** The dotplot is approximately normal with mean 10 gallons and standard deviation 0.4 gallon.