

Economics 141
 Fall 2009
 Gallet
 Homework #3

[1] The employment center at a university collected information on the employment and living arrangements of 100 students, obtaining:

<u>Living Arrangements</u>	<u>Work Situation</u>		
	<u>Full Time</u>	<u>Part Time</u>	<u>Do not Work</u>
In Dorm	19	22	20
Not in Dorm	25	9	5

where the numbers in the box indicate the number of students corresponding to the respective work situation and living arrangement.

- A. What is the probability of selecting a student at random who lives in the dorm?
- B. What is the probability of selecting a student at random who works either full time or part time?
- C. What is the probability of selecting a student at random who either works part time or lives in the dorm (or both)?
- D. What is the probability of selecting a student at random who does not work and lives in the dorm?

[2] James White is a stockbroker whose biggest client expresses an interest in expanding her investments in the market. Three stocks interest her, but she wishes to invest her money in only one of them. Based on the historical performances of these stocks over the years, James provides the following annual returns (in percentages) and corresponding probabilities for each of these three stocks below:

<u>Return</u>	<u>Stock A</u>	<u>Probability</u>	
		<u>Stock B</u>	<u>Stock C</u>
5	0	0.10	0.40
10	1	0.60	0.40
15	0	0.30	0.20

For example, if the investor chooses stock A there is a 100% chance of earning a rate of return of 10%, and a zero chance of earning rates of return of 5% and 15%. Alternatively, if stock B is chosen there is a 10% chance of earning 5%, a 60% chance of earning 10%, and a 30% chance of earning 15%.

- A. If the investor wishes to pick that stock with the highest long run average return, providing appropriate calculations, which stock should she tell James to invest her money?
- B. Alternatively, suppose the investor is risk averse, wishing to choose that stock with the smallest standard deviation (indicating a “more stable” return over time). Providing appropriate calculations, which stock should she tell James to invest her money?

[3] Ball-Bearings, Inc. produces ball bearings automatically on a Kronar BBX machine. The ball bearings produced are normally distributed with a mean of 20.00 mm (millimeters) and a standard deviation of 0.15 mm.

- A. What percent of the ball bearings will have diameters between 20.00 mm and 20.27 mm?
- B. What percent of the ball bearings will have diameters of 20.27 mm or more?
- C. What percent of the ball bearings will have diameters between 19.85 mm and 20.30 mm?
- D. For every 10,000 ball bearings produced, approximately how many will have diameters 19.91 mm or less?
- E. If ball bearings with diameters greater than 20.32 mm or less than 19.68 mm are classified as “defective”, in a batch of 10,000 ball bearings how many are likely defective?

[4] Suppose the diameter of a certain type of steel pipe is normally distributed with a mean of 12 inches and a standard deviation of 0.5 inches. If the standard deviation decreased to 0.25 inches, the probability of a steel pipe being between 11.80 and 12.20 inches would increase. Why? Use a graph of the normal distribution to illustrate your answer.