Homework #2 – Due Thursday, Sep. 22
COR1-GB.1305.04 – Statistics and Data Analysis

Problem 1

Suppose that you roll a red and a green six-sided die.

(a) What is the sample space?

(b) Assuming that the dice are fair, what is the probability that the value of the red die roll is greater than the value of the green die roll?

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Problem 2

Suppose that in the packaged-cereals industry, 29% of all vice presidents hold MBA degrees, 24% hold undergraduate business degrees, and 8% hold both. A vice president is to be selected at random.

(a) What is the probability that the vice president holds either an MBA or an undergraduate business degree (or both)?

(b) What is the probability that the vice president holds neither degree?

(c) What is the probability that the vice president holds an MBA degree but not an undergraduate business degree?

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Problem 3

Suppose that the probability that a child born in the US in 2016 will survive past age 80 is 40%, and the probability that he or she will survive past age 90 is 20%. For an 80-year-old who was born in the US in 2016, what is the probability of surviving past age 90?

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Problem 4

In an article in *The Journal of Portfolio Management*, Goetzmann and Ibbotson selected 1556 mutual funds and recorded their current and past performances. They produced the following table:

	Current Winner	Current Loser	Total
Past Winner	482	296	778
Past Loser	285	493	778
Total	767	789	1556

Here, "Past Loser" indicates that the fund lost value in the distant past, and "Current Loser" indicates that the fund lost value in the recent past. Suppose that you select a random fund from Goetzmann and Ibbotson's study. Let $A = \{\text{Past Loser}\}$, and $B = \{\text{Current Loser}\}$. Based on these data, calculate the following probabilities, and write in words what these probabilities represent.

(a) Find $P(A)$, $P(B)$ and $P(A \cap B)$.

(b) Are the events A and B independent? *Note: We say that events A and B are independent whenever $P(A \cap B) = P(A)P(A)$.*

(c) Find $P(B \mid A)$ and $P(B \mid A^c)$. Are they equal?

(d) Show that $P(B^c) \neq P(B^c \mid A^c)$.

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