ECON 3640–001

Problem Set 2

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Problem 1

A poll aggregator wants to combine the results of 2 different pollsters into 1 single prediction. In doing so, they take into account the track record for the 2 pollsters.

- In 30% of past elections, pollster 1's predictions were "right" (results were within the margin of error of their prediction).
- In 5%, both pollsters were right.
- In 10%, pollster 1 was wrong but pollster 2 was right.

For the next election, let *A* be the event that pollster 1 is right and *B* be the event that pollster 2 is right.

(a) Write down all of the information you are given about *A* and *B* in the problem.

(b) What is the probability that pollster 2 is right?

(c) What is the probability that at least 1 of the 2 pollsters is right?

(d) What is the probability that at least 1 is wrong?

(e) Fill out a contingency table and utilize this to confirm your answers above.

Problem 2

Suppose one rolls two fair six-sided dice. Each one of the 36 possible outcomes is assumed to be equally likely.

(a) Find the probability that doubles are rolled. Call it *P(A)*.

(b) Given that the roll results in a sum of 4 or less, find the conditional probability that doubles are rolled. Call it *P(B)*.

(c) Find the probability that at least one die roll is a 6. Call it *P(C)*.

(d) Given that the two dice land on different numbers, find the conditional probability that at least one die roll is a 6.

(e) Given that the minimum of the two rolls is equal to 3, what is the probability that the maximum of the two rolls is equal to 4?

Problem 3

Approximately 10% of people are left-handed. If two people are selected at random, what is the probability of the following events?

(a) Both are right-handed.

(b) Both are left-handed.

(c) One is right-handed and the other is left-handed.

(d) At least one is right-handed.

Problem 4

A financial analyst estimates that the probability that the economy will experience a recession in the next 12 months is 25%. She also believes that if the economy encounters a recession, the probability that her mutual fund will increase in value is 20%. If there is no recession, the probability that the mutual fund will increase in value is 75%. Find the probability that the mutual fund's value will increase.

Problem 5

Bad gums may mean a bad heart. Researchers discovered that 85% of people who have suffered a heart attack had periodontal disease, an inflammation of the gums. Only 29% of healthy people have this disease. Suppose that in a certain community heart attacks are quite rare, occurring with only 10% probability. If someone has periodontal disease, what is the probability that he or she will have a heart attack?

Problem 6

The mark on a statistics exam that consists of 100 multiple-choice questions is a random variable.

(a) What are the possible values of this random variable?

(b) Are the values countable? Explain.

(c) Is there a finite number of values? Explain.

(d) Is the random variable discrete or continuous? Explain.

Problem 7

The number of accidents that occur on a busy stretch of highway is a random variable.

(a) What are the possible values of this random variable?

(b) Are the values countable? Explain.

(c) Is there a finite number of values? Explain.

(d) Is the random variable discrete or continuous? Explain.