Assignment Activity Unit 3

Department of Computer Science, UoPeople

MATH 1280-01 - AY2025-T3

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**21st Friday 2025**

**Mathematics Assignment: Probability in the US Senate**

**Introduction** Probability is a fundamental concept in statistics that helps determine the likelihood of an event occurring. In this assignment, we analyze the probability of certain events related to the reelection status of US senators based on the given data.

**Given Data**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Up for Re-election | Democratic Party | Republican Party | Other | Total |
| November 2014 | 20 | 13 | 0 | 33 |
| November 2016 | 10 | 24 | 0 | 34 |
| **Total** | **30** | **37** | **0** | **67** |

### ****Question 1:****

What is the probability that a randomly selected senator is up for reelection in November 2016?

To determine this probability, we use the formula for probability:

The number of senators up for reelection in November 2016 is 34, and the total number of senators is 67. Thus, the probability is:

**Final Answer:** The probability that a randomly selected senator is up for reelection in November 2016 is approximately **0.5075 (or 50.75%)**.

### ****Question 2:****

What is the probability that a randomly selected senator is a Republican or is up for reelection in November 2014?

To solve this, we use the formula for the union of two events:

Where:

* **A** is the event that a senator is a Republican:
* **B** is the event that a senator is up for reelection in November 2014:
* **A \cap B** is the event that a senator is both a Republican and up for reelection in November 2014:

Now, applying the formula:

**Final Answer:** The probability that a randomly selected senator is either a Republican or up for reelection in November 2014 is approximately **0.8507 (or 85.07%)**.

### ****Question 3:****

Suppose that a member of the US Senate is randomly selected. What is the probability that the senator is up for reelection in November 2014, given that this senator is a Republican?

This is a conditional probability problem, where we use the formula:

Where:

* **A** is the event that the senator is up for reelection in November 2014.
* **B** is the event that the senator is a Republican.
* **P(A \cap B) = \frac{13}{67}** (Republicans up for reelection in 2014).
* **P(B) = \frac{37}{67}** (Total Republicans).

Now, calculating:

**Final Answer:** The probability that a senator is up for reelection in November 2014, given that they are a Republican, is approximately **0.3514 (or 35.14%)**.

**Conclusion** In this assignment, we applied fundamental probability principles to analyze the likelihood of different reelection scenarios for US senators. The calculations demonstrate the practical applications of probability in real-world data interpretation.