

## 11.16.4.9.2

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# Problem Statement

## QUESTION

If 4-digit numbers greater than 5,000 are randomly formed from the digits 0, 1, 3, 5, and 7, what is the probability of forming a number divisible by 5 when the repetition of digits is not allowed?

# Solution

**Total Valid 4-Digit Numbers** A 4-digit number greater than 5,000 must start with either 5 or 7. The remaining digits can be any of the remaining digits without repetition.

- ▶ First Digit: 2 choices (5 or 7).
- ▶ Second Digit: 4 choices (excluding the first digit).
- ▶ Third Digit: 3 choices (excluding the first two digits).
- ▶ Fourth Digit: 2 choices (excluding the first three digits).

Total valid numbers:

$$2 \times 4 \times 3 \times 2 = 48$$

# Numbers Divisible by 5

A number is divisible by 5 if its last digit is either 0 or 5. We consider two cases:

## 1. Last Digit is 0

- ▶ First Digit: 2 choices (5 or 7).
- ▶ Second Digit: 3 choices (excluding the first digit and 0).
- ▶ Third Digit: 2 choices (excluding the first two digits and 0).
- ▶ Fourth Digit: 1 choice (0).

Total numbers:

$$2 \times 3 \times 2 \times 1 = 12$$

# Numbers Divisible by 5

## 2. Last Digit is 5

- ▶ First Digit: 1 choice (7, since 5 is already used as the last digit).
- ▶ Second Digit: 3 choices (excluding the first digit and 5).
- ▶ Third Digit: 2 choices (excluding the first two digits and 5).
- ▶ Fourth Digit: 1 choice (5).

Total numbers:

$$1 \times 3 \times 2 \times 1 = 6$$

Total numbers divisible by 5:

$$12 + 6 = 18$$

# Probability Calculation

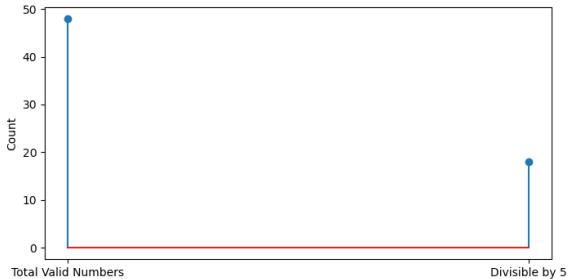
The probability  $P$  is the ratio of numbers divisible by 5 to the total valid numbers:

$$P = \frac{18}{48} = \frac{3}{8} = 0.375$$

# Summary of Steps

1. Generate All Valid 4-Digit Numbers:
  - ▶ Generate all combinations of 4-digit numbers starting with 5 or 7.
  - ▶ Ensure no repetition of digits.
2. Check Divisibility by 5:
  - ▶ For each valid number, check if the last digit is 0 or 5.
3. Count and Calculate Probability:
  - ▶ Count the total valid numbers and the numbers divisible by 5.
  - ▶ Compute the probability as the ratio of the two counts.

# STEM PLOT





# C-code

<https://github.com/Srihaas15/EE1003/11.16.4.9.2/codes/sol.c>

# Python-code

<https://github.com/Srihaas15/EE1003/11.16.4.9.2/codes/sol.py>