

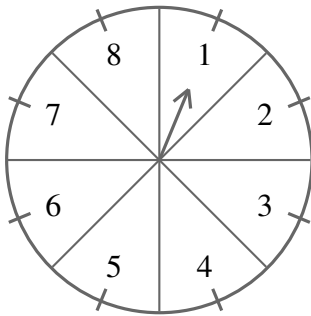
Probability Assignment 4

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1 PROBLEM STATEMENT

A game of chance consists of spinning an arrow which comes to rest pointing at one of the numbers 1, 2, 3, 4, 5, 6, 7, 8 (see figure), and these are equally likely outcomes. What is the probability that it will point at:

- 1) 8?
- 2) an odd number?
- 3) a number greater than 2?
- 4) a number less than 9?



2 ANSWER

Since each outcome is equally likely, we can model this situation with a discrete uniform distribution. Let X be the random variable representing the number that the arrow points at. Then X has the following probability mass function:

$$\Pr(X) = \begin{cases} \frac{1}{8} & 1 \leq i \leq 8 \\ 0 & \text{otherwise} \end{cases} \quad (1)$$

- 1) $\Pr(8)$:

$$\Pr(X = 8) = \frac{1}{8} \quad (2)$$

- 2) $\Pr(\text{Odd numbers})$:

$$\sum_{n=0}^3 \Pr(X = 2n + 1) = \frac{4}{8} = \frac{1}{2} \quad (3)$$

- 3) $\Pr(\text{Number} > 2)$:

$$\sum_{n=3}^8 \Pr(X = n) = \frac{6}{8} = \frac{3}{4} \quad (4)$$

- 4) $\Pr(\text{Number} < 9)$: All numbers are less than 9

$$\sum_{n=1}^8 \Pr(X = n) = \frac{8}{8} = 1 \quad (5)$$