STAT 2857A – Lecture 8 Examples and Exercises

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Example 8.1

Approximately 79% of world's population has brown eyes.

Suppose that we sample 5 people from the population at random with replacement and record their eye-colour as brown or not brown. Let X be the number of people in our sample with brown eyes.

a) Compute the pmf of X.
b) Draw a figure showing the pmf of X.
c) Compute the cdf of X.
d) Draw a figure showing the cdf of X.

Example 8.2

Let p be the proportion of the world's population with brown eyes. Suppose that we sample 5 people from the population at random with replacement and record their eye-colour as brown or not brown. Let X be the number of people in our sample with brown eyes.

How would the distribution of X change if p was varied?

Exercise 8.1

Consider a discrete random variable, Z, with the cdf:

$$
F(z) = \begin{cases}
0 & x < 0 \\
0.292 & 0 \leq x < 1 \\
0.745 & 1 \leq x < 2 \\
0.965 & 2 \leq x < 3 \\
0.998 & 3 \leq x < 4 \\
1 & x \geq 4
\end{cases}
$$

a) Sketch the cdf.
b) What are the possible values Z (i.e., for what values of z is $P(Z = z) > 0$)?
c) What is the probability mass function?
d) Sketch the pmf.