Full Name: _____

Student No: _____

Grade:

Read before you start:

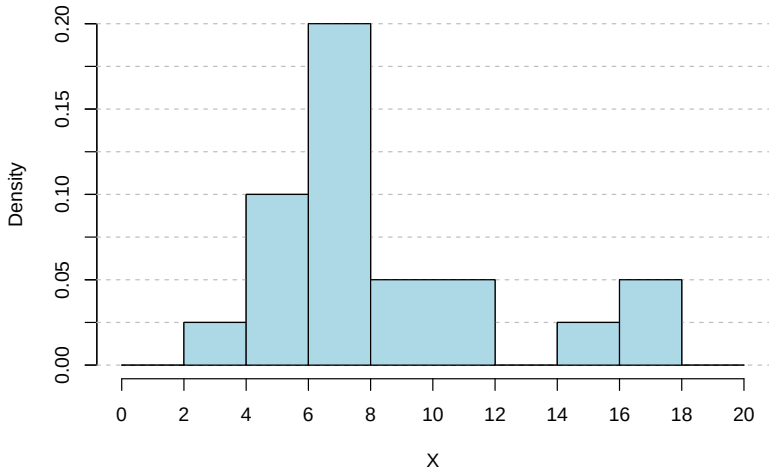
- The exam has **two parts** and **three phases**:
  - ♣ Phase 1 (70 minutes): You work individually on **both parts** and submit your solutions.
  - ♣ Phase 2 (20 minutes): You discuss the problems in **part 2** in pairs or groups of three.
  - ♣ Phase 3 (30 minutes): You work individually and submit updated solutions to all or some of the problems in **part 2**.

  Phases 2 and 3 are optional.
- Please make sure you write your full name and student number on everything you hand in.
- To avoid chaos, please make sure to exactly follow the proctors' instructions.
- **All answers require justifications**.

You can use the remainder of this page as scratch paper.

Part 1

1. (10 points) The following histogram illustrates the distribution of a numerical variable X in a data set.



   (a) Which is larger: the percentage of cases with X values between 2 and 6, or the percentage of cases with X values between 8 and 12?

   (b) What can you say about the median of X in this data set?

2. (15 points) Determine which of the following statements is True and which is False. In each case, give a short justification.

_____ If two events A and B are independent, then so are their complements.

_____ If two events A and B are independent, then necessarily $\mathbb{P}(A \cup B) = \mathbb{P}(A) + \mathbb{P}(B)$.

_____ If $\mathbb{P}(A \mid B) > \mathbb{P}(A)$ for two events A and B, then we also have $\mathbb{P}(B \mid A) > \mathbb{P}(B)$.

3. (15 points) A bag contains 100 cards with numbers 1 to 100 written on them. We draw two cards from the bag at random without replacement.

   (a) Identify the sample space and the probability of each possible outcome.

   (b) What is the probability that both numbers are even?

   (c) Given that both numbers are even, what the probability that one of them is 100?

You can use this page as extra space for your solutions.