AP STATISTICS
PROBLEM SET #3

DUE DATE: SEPTEMBER 6, 2023

Question 1 (Due 11:59PM Monday)**.** Complete the **Normal Distribution Quiz** on AP Classroom

Question 2. The following data shows the lengths of 30 fish caught in a lake during a fishing competition. The measurements were taken to the nearest centimetre.

31	38	34	40	24	33	30	36	38	32	35	32	36	27	35
40	34	37	44	38	36	34	33	31	38	35	33	36	33	28

(1) Create a cumulative frequency table using intervals $24 \leq x < 27, 27 \leq x < 30$, and so on.
(2) Draw a graph of the cumulative frequency table

Question 3. Suppose $X = [0, 3]$ is a continuous random variable and define a probability density function f by

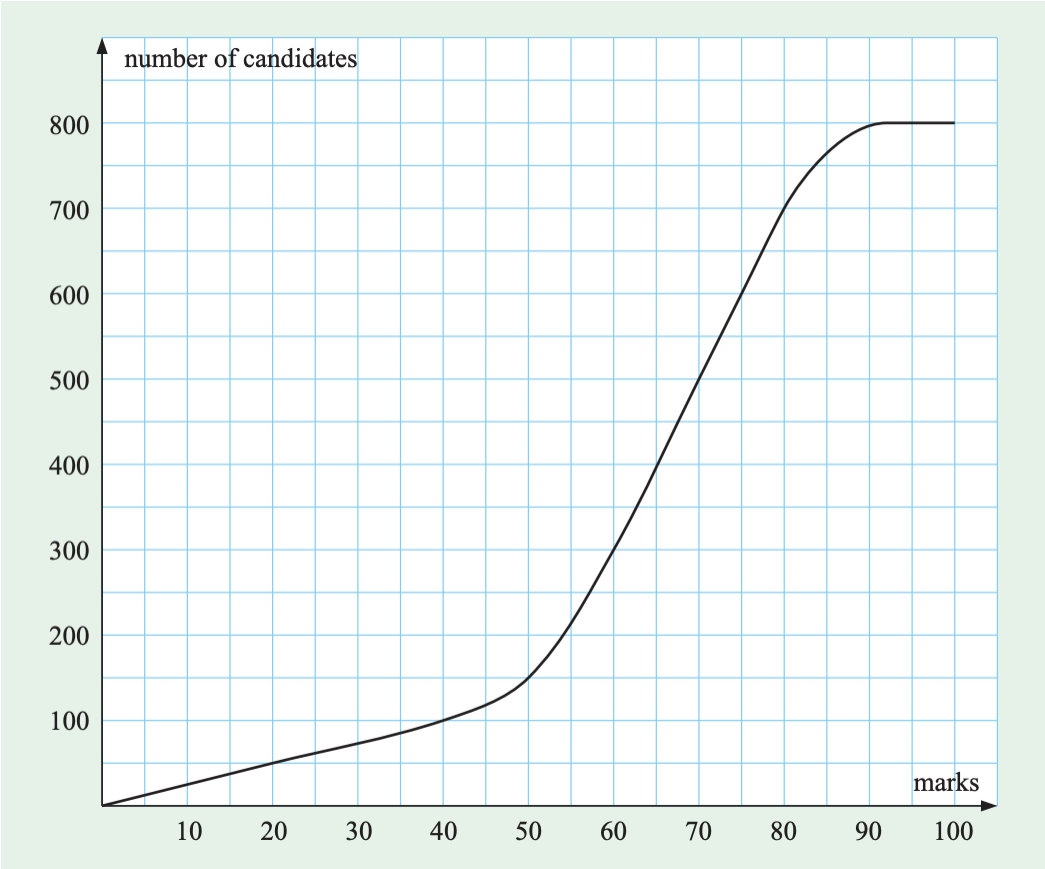
$$f(x) = \begin{cases} k & \text{if } 0 \leq x \leq 3 \\ 0 & \text{elsewhere} \end{cases}$$

(a) Find the value of k.
(b) Sketch a graph of $f(x)$
(c) Compute the mean and variance.
(d) Compute the following probabilities:
  (a) $Prob(1 < X < 3)$
  (b) $Prob(X = 1.5)$
  (c) $Prob(X < 1.5)$
  (d) $Prob(X > 2)$
(e) Compute the following values for the Cumulative Distribution Function (CDF):
  (a) $CDF(x = 0)$
  (b) $CDF(x = 1)$
  (c) $CDF(x = 1.5)$
  (d) $CDF(x = 2)$
  (e) $CDF(x = 3)$
(f) Draw a graph of the CDF

Question 4. A bottle filling machine fills an average of 20,000 bottles per day with a standard deviation of 2000 bottles. Assuming that production is normally distributed and the year comprises of 260 working days, calculate the (approximate) number of days that

(a) Under 18,000 bottles are filled
(b) Over 16,000 bottles are filled
(c) Between 18,000 and 24,000 bottles are filled.

Question 5. A statistics exam, graded out of 100 marks, was given to 800 students. A cumulative distribution graph of the results is given below.



(a) How many students scored 45 marks or less?
(b) What is the median score?
(c) Between what values do the middle 50% of test results lie?
(d) Find the interquartile range (IQR) of the data.
(e) What percentage of students obtained a mark of 55 or more?
(f) If an award is given to the top 10% of students, what score is required to receive the award?