Directions

Scan and upload your *handwritten* solutions to eLearning by the end of the day on **Monday, September 26 by 11:59 pm**. Show all work including formulas, integrals, or calculator codes where necessary or no credit can be given.

Problem 1 (4 points)

The function $f(x)$ below is a probability density function (pdf) for the continuous random variable X. Answer the following.

$$f(x) = \begin{cases} x & 0 \leq x \leq 1 \\ 2 - x & 1 < x \leq 2 \\ 0 & otherwise \end{cases}$$

(a) Neatly sketch $f(x)$. Use the plot to guess the expected value of X. Explain your guess.
(b) Set up and solve an integral to calculate $P(1/2 \leq X < 3/2)$.
(c) Find the c.d.f. and write your final result as a piecewise function.

Problem 2 (3 points)

Let X be a continuous random variable with pdf $f(X) = 3x^3 + \frac{1}{4}$ on the interval $0 < x < c$.

(a) Find the value of c that makes f a valid pdf.
(b) Compute the expected value and variance of X.

Problem 3 (3 points)

Chipotle can serve at a rate of two customers every three minutes.

(a) What is the probability that the wait time for the next customer will exceed one minute?
(b) What is the probability that the wait time for the next customer will exceed 4 minutes, given that they have been waiting for 2 minutes already?
(c) There are 4 people in line. What is the probability that it will take at most 6 minutes to serve all of them?

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