Instructions

(1) Please submit your written solutions to crowdmark with each problem started on a separate page.
(2) Please list your collaborators on your assignment. It's important to give credit to those you have worked with.

Question 1 (Continuous Distributions)**.** The shifted exponential distribution is used to describe waiting times where there is a minimum amount of time that needs to elapse before the event can occur. The probability density function is given by

$$f(x) = \begin{cases} ce^{-\lambda x} & x \geq a \\ 0 & x < a \end{cases}$$

for some $c \in \mathbb{R}$ and some $a > 0$. Find the value of c for which f is a probability density function, sketch the pdf, and determine the median of the distribution.

Question 2 (Continuous Distributions)**.** The Gamma distribution is used to describe waiting times where more than one consecutive trials need to occur in an event. The probability density function for two consecutive events is given by

$$f(x) = \begin{cases} Cxe^{-\lambda x} & x \geq 0 \\ 0 & x < 0 \end{cases}$$

for some $C \in \mathbb{R}$. Find the value of C for which f is a probability density function and sketch the pdf.

Question 3 (Continuous Distributions)**.** Sherry is helping her company search for Lithium deposits so they can make better batteries. Suppose that the mass of lithium (in Tons) in a given deposit has a distribution with the probability density function

$$f(x) = \begin{cases} \frac{3{,}000{,}000}{x^4} & x \geq 100 \\ 0 & x < 100 \end{cases}$$

a. What is the probability that Sherry finds a deposit with less than 300 tons of lithium?
b. What is the probability that Sherry finds a deposit with more than 500 tons of lithium?
c. What is the mean deposit size that Sherry will find?