1.   Find the average value of $f(x) = x^3$, over $[0, 1]$.

2.   Classify the following random variables as discrete or continuous. If the random variable is discrete, state whether the sample space is infinite or finite.

(a) X is the number of defective automobiles that come off an assembly line on a given day.
(b) X is the age in years of voters in a local election.

3.   A fire department in a medium-sized city receives an average of 2.5 calls each minute. Use a Poisson distribution to find the probability that in a given minute no calls occur. What is the probability that exactly 4 calls will occur in a given minute?.

4. A man who is currently 20 years old wants to purchase life insurance. The insurance company is interested in determining at what age X (in years) he is likely to die. If the probability density function is $f(x) = \dfrac{3}{688,000}\left(-x^2 + 200x - 5000\right)$, find the probability that the man is likely to die at or before age 60.

5. Suppose the outcome X of an experiment lies between 0 and 2, and the probability density function for X is $f(x) = \dfrac{1}{2}x$. Find (a) $P(X \le 1)$, (b) $P(1 \le X \le 1.5)$, (c) $P(1.5 \le X)$

6. A toy machine produces a toy every 2 minutes. An inspector arrives at a random time and must wait X minutes for a toy.

    (a) Find the probability density function for X.
    (b) Find the probability that the inspector has to wait at least 1 minute.
    (c) Find the probability that the inspector has to wait no more than 1 minute.