Solution of Assignment 5

The time it takes to repair a personal computer is a random variable whose density, in hours, is given by

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

The cost of the repair depends on the time it takes and is equal to $4 + 3\sqrt{x}$ when the time is x. Compute the expected cost to repair a personal computer.

The expected cost of the repair is given by the expected value of the random variable $Y = 4 + 3\sqrt{X}$ which is given by

$$E[Y] = \int_{-\infty}^{\infty} (4 + 3\sqrt{x}) f(x)\, dx = \int_{0}^{2} (4 + 3\sqrt{x})\left(\frac{1}{2}\right) dx$$

$$\Rightarrow E[Y] = \frac{1}{2}\int_0^2 (4+3\sqrt{x})\,dx = \frac{1}{2}\left[\, 4x + 3\frac{x^{3/2}}{3/2} \,\right]_0^2$$

$$= \frac{1}{2}\left[\, 4x + 2x^{3/2} \,\right]_0^2 = \frac{1}{2}\left[\left(4(2) + 2(2)^{3/2}\right) - 0\right]$$

$$\Rightarrow \boxed{E[Y] = 4 + 2^{3/2} \approx 6.83}$$ Ans