King Saud University
College of Sciences
Mathematics Department

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Solution of Quiz 1 October 3, 2019 ACTU 464

Question (**5 marks**)
A decision maker has utility function $u(x) = \sqrt{x}$, $x \geq 0$. He is given the choice between two random amounts X and Y, in exchange for his entire present capital W. The probability distributions of X and Y are given by $P[X = 400] = P[X = 900] = 0.5$ and $P[Y = 100] = 1 - P[Y = 1600] = 0.6$. Show that he prefers X to Y.

Solution
We calculate $E[u(X)] - E[u(Y)]$. We have

$$\begin{aligned} E[u(X)] - E[u(Y)] &= \left(\sqrt{400} \times 0.5 + \sqrt{900} \times 0.5\right) - \left(\sqrt{100} \times 0.6 + \sqrt{1600} \times 0.4\right) \\ &= (20 \times 0.5 + 30 \times 0.5) - (10 \times 0.6 + 40 \times 0.4) \\ &= 25 - 22 = 3 > 0. \end{aligned}$$

That is $E[u(X)] > E[u(Y)]$, then decision maker will prefer X to Y.