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HOMEWORK # 2 ANSWERS

(a) If $p = r = \frac{1}{6}$ then $A = \begin{pmatrix} \$16 & \$20 & \$36 & \$40 \\ \frac{1}{6} & \frac{1}{2} & \frac{1}{12} & \frac{1}{4} \end{pmatrix}$ and $B = \begin{pmatrix} \$16 & \$20 & \$36 & \$40 \\ \frac{1}{6} & \frac{1}{24} & \frac{13}{24} & \frac{1}{4} \end{pmatrix}$. Thus the CDF of A is $\begin{pmatrix} \$16 & \$20 & \$36 & \$40 \\ \frac{1}{6} & \frac{2}{3} & \frac{3}{4} & 1 \end{pmatrix}$ and the CDF of B is $\begin{pmatrix} \$16 & \$20 & \$36 & \$40 \\ \frac{1}{6} & \frac{5}{24} & \frac{3}{4} & 1 \end{pmatrix}$ thus B dominates A in the sense of first-order stochastic dominance.

(b) If $s = \frac{1}{3}$ then $B = \begin{pmatrix} \$16 & \$20 & \$36 & \$40 \\ \frac{3}{8} & \frac{1}{24} & \frac{1}{3} & \frac{1}{4} \end{pmatrix}$ so that the CDF of B is $\begin{pmatrix} \$16 & \$20 & \$36 & \$40 \\ \frac{3}{8} & \frac{5}{12} & \frac{3}{4} & 1 \end{pmatrix}$. The CDF of A is $\begin{pmatrix} \$16 & \$20 & \$36 & \$40 \\ p & p+q & p+q+\frac{1}{12} & 1 \end{pmatrix}$. Thus, in order for A to dominate B in the sense of first-order stochastic dominance we need: (1) $p \leq \frac{3}{8}$ and (2) $p+q \leq \frac{5}{12}$ with at least one of the two inequalities as a strict inequality. These two inequalities (in particular, the second one) cannot be satisfied, because in order for p and q to make sense it must be that $p + q = 1 - (1/12) - (1/4) = 8/12$.

(c) If $r = \frac{1}{3}$ then $B = \begin{pmatrix} \$16 & \$20 & \$36 & \$40 \\ \frac{1}{3} & \frac{1}{24} & \frac{3}{8} & \frac{1}{4} \end{pmatrix}$.

(c.1) The expected value of B is $\frac{89}{3} = 29.67$

(c.2) In order for C to be a MPS of B we need v and w to satisfy: (1) $v + w = \frac{1}{72}$ and (2) $18v + 34w = \frac{1}{72}20 = \frac{5}{18}$.

(d) If $r = s$ then $B = \begin{pmatrix} \$16 & \$20 & \$36 & \$40 \\ \frac{17}{48} & \frac{1}{24} & \frac{17}{48} & \frac{1}{4} \end{pmatrix}$.

(d.1) The expected value of B is $\frac{117}{4} = 29.25$

(d.2) In order for D to be a MPS of B we need v and w to satisfy: (1) $x + y = \frac{1}{24}$ and (2) $18x + 34y = \frac{1}{24}20 = \frac{5}{6}$.
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