ECON 103 : ECONOMICS of UNCERTAINTY Professor Giacomo Bonanno

FIRST MIDTERM EXAM: ANSWERS for VERSION 2

1. (a) $A = (59{,}000 \ , \ 74{,}000)$, $B = (60{,}800 \ , \ 72{,}800)$, $C = (57{,}000 \ , \ 75{,}000)$.

(b) (b.1) We need $6{,}000 - p(25{,}000 - 15{,}000) = 7{,}200 - p(25{,}000 - 12{,}000)$, that is, $p = \frac{2}{5} = 0.4$. **(b.2)** The slope is $-\frac{\frac{2}{5}}{\frac{3}{5}} = -\frac{2}{3} = -0.67$.

(c) When $p = \frac{2}{5}$, the expected profit from *B* is 2,000 and the expected profit from *C* is 2,200. Thus *C* lies on a **lower** isoprofit line (corresponding to higher profits) than the one that goes through contract *B*.

(d) For zero profits with full insurance we need the premium to be equal to the expected loss: $h = p(25{,}000)$.

(e) (e.1) $EU(A) = 0.6\sqrt{59{,}000} + 0.4\sqrt{74{,}000} = 254.55$, $EU(B) = 0.6\sqrt{60{,}800} + 0.4\sqrt{72{,}800} = 255.87$ $EU(C) = 0.6\sqrt{57{,}000} + 0.4\sqrt{75{,}000} = 252.79$. Thus his ranking is $B \succ A \succ C$.

(e.2) The utility of No Insurance is $0.6\sqrt{55{,}000} + 0.4\sqrt{80{,}000} = 253.85$. Thus he would choose not to insure.

2. (a) $U(D) = 60$ and $U(A) = 10$**.** Then the expected utility of lottery $\begin{pmatrix} A & D \\ \frac{1}{5} & \frac{4}{5} \end{pmatrix}$ is $\frac{1}{5}10 + \frac{4}{5}60 = 50$. Hence $U(B)$ = 50. Thus the expected utility of lottery $\begin{pmatrix} B & A \\ \frac{1}{4} & \frac{3}{4} \end{pmatrix}$ is $\frac{1}{4}50 + \frac{3}{4}10 = 20$, so that $U(C) = 20$.

(b) $\mathbb{E}[U(L)] = \frac{1}{10}10 + \frac{2}{5}20 + \frac{1}{2}60 = 39$ and $\mathbb{E}[U(M)] = \frac{2}{5}50 + \frac{3}{5}20 = 32$ thus she prefers *L* to *M*.

(c) We need $50p + 20(1-p) = 39$. Thus $p = \frac{19}{30} = 63.33\%$.

(d) Start from $\begin{matrix} A & B & C & D \\ 10 & 50 & 20 & 60 \end{matrix}$, subtract 10: $\begin{matrix} A & B & C & D \\ 0 & 40 & 10 & 50 \end{matrix}$ and finally divide by 50 to get $\begin{matrix} A & B & C & D \\ 0 & \frac{4}{5} & \frac{1}{5} & 1 \end{matrix}$