HOMEWORK # 3 ANSWERS

(a) Since Ann is risk neutral, we can take her utility of money function to be the identity function: $V(m) = m$, so that the expected utility of a lottery coincides with the expected value. Thus the expected value of choice A is $\frac{1}{6}25 + \frac{3}{6}100 + \frac{2}{6}16 = \frac{357}{6} = 59.5$.

The expected value of choice B is $\frac{1}{6}64 + \frac{3}{6}81 + \frac{2}{6}9 = \frac{325}{6} = 54.167$.

The expected value of choice C is $\frac{1}{6}4 + \frac{3}{6}36 + \frac{2}{6}49 = \frac{210}{6} = 35$.

Hence Ann will choose A.

(b) Since Ann is risk neutral we know that the identity function represents her preferences:

basic outcome	$100	$81	$64	$49	$36	$25	$16	$9	$4
utility	100	81	64	49	36	25	16	9	4

. To normalize first subtract 4 from each utility:

basic outcome	$100	$81	$64	$49	$36	$25	$16	$9	$4
utility	96	77	60	45	32	21	12	5	0

then divide by 96:

basic outcome	$100	$81	$64	$49	$36	$25	$16	$9	$4
utility	1	77/96	60/96	45/96	32/96	21/96	12/96	5/96	0

(c) For Bob, the expected utility of choice A is $\frac{1}{6}5 + \frac{3}{6}10 + \frac{2}{6}4 = \frac{43}{6} = 7.167$.

The expected utility of choice B is $\frac{1}{6}8 + \frac{3}{6}9 + \frac{2}{6}3 = \frac{41}{6} = 6.833$.

The expected utility of choice C is $\frac{1}{6}2 + \frac{3}{6}6 + \frac{2}{6}7 = \frac{34}{6} = 5.667$.

Thus Bob, too, will choose A.

(d) With perfect information Ann will choose B if she learns that the state is s_1, she will choose A if she learns that the state is s_2 and will choose C if she learns that the state is s_3. Thus the maximum price she is willing to pay for perfect information is given by the solution to $\frac{1}{6}64 + \frac{3}{6}100 + \frac{2}{6}49 - p = \frac{357}{6}$ which is $p = \frac{35}{2} = 17.5$.

(e) Bob's expected utility if he pays $19 for perfect information is $\frac{1}{6}\sqrt{64-19} + \frac{3}{6}\sqrt{100-19} + \frac{2}{6}\sqrt{49-19} = 7.44$ which is higher than the expected utility of choosing A without information, thus he will decide to pay the expert.

(f) Ann's expected utility of acquiring perfect information at price $19 is $\frac{1}{6}64 + \frac{3}{6}100 + \frac{2}{6}49 - 19 = 58$. Thus her expected utility changes from 59.5 to 58: a change of -1.5 (not surprising, since the maximum price she is willing to pay is $17.5).

(g) $\frac{1}{6}\sqrt{64-p} + \frac{3}{6}\sqrt{100-p} + \frac{2}{6}\sqrt{49-p} = \frac{43}{6}$ (recall that $\frac{43}{6} = 7.167$ is the expected utility of choosing A without information). [In case you are interested, the solution is $p = \$22.83$.