PRACTICE THIRD MIDTERM: ANSWERS

1. (a)

Total number of students	10,000	Percentage of total
Number of students who got an A	2,000	20%
Number of students who got a B	8,000	80%
Number of students who got P in midterm and A in the course	1500 (75% of 2,000)	15%
Number of students who got F in midterm and A in the course	500 (25% of 2,000)	5%
Number of students who got P in midterm and B in the course	4,000 (50% of 8,000)	40%
Number of students who got F in midterm and B in the course	4,000 (50% of 8,000)	40%

(b) 0.2 (or 20%).   **(c)** $\dfrac{1,500}{1,500+4,000} = 0.27$ (or 27%).

(d) $\dfrac{4,000}{500+4,000} = 0.89$ (Or 89%).   **(e)** 0.15 (or 15%).

2.

(a) For Ann $U_0(\$100 \text{ in 4 years}) = (0.9)^4(\sqrt{100}) = 6.561$ and
$U_0(\$400 \text{ in 6 years}) = (0.9)^6(\sqrt{400}) = 10.629$. Thus she chooses to get $400 in 6 years.

(b) For Christina, $U_0(\$100 \text{ in 4 years}) = (0.7)(0.8)^4(\sqrt{100}) = 2.867$ and
$U_0(\$400 \text{ in 6 years}) = (0.7)(0.8)^6(\sqrt{400}) = 3.67$. Thus she too chooses to get $400 in 6 years.

(c) For Ann $U_4(\$100 \text{ now}) = \sqrt{100} = 10$ and $U_4(\$400 \text{ in 2 years}) = (0.9)^2(\sqrt{400}) = 16.2$. Thus she chooses $400 in two years.

(d) For Christina $U_4(\$100 \text{ now}) = \sqrt{100} = 10$ and $U_4(\$400 \text{ in 2 years}) = (0.7)(0.8)^2(\sqrt{400}) = 8.96$. Thus she changes her mind and chooses to get $100 right away.

(e) Yes, because after 4 years she confirms her earlier choice.

(f) No, because after 4 years she changes her initial plan.

3. **(a)** $EU(a) = \frac{1}{3}5 + \frac{1}{12}5 + \frac{1}{6}4 + \frac{1}{4}2 + \frac{1}{6}2 = 3.583$, $\quad EU(b) = \frac{1}{3}6 + \frac{1}{12}1 + \frac{1}{6}6 + \frac{1}{4}1 + \frac{1}{6}1 = 3.5$ and

$EU(c) = \frac{1}{3}0 + \frac{1}{12}4 + \frac{1}{6}1 + \frac{1}{4}5 + \frac{1}{6}0 = 1.75$. Thus **in the absence of information you would choose**
a and have an expected utility of 3.583.

(b.1) If you receive information $\{s_1, s_2, s_3\}$, you will update you beliefs as follows:

probability	$\frac{4}{7}$	$\frac{1}{7}$	$\frac{2}{7}$
state →	s_1	s_2	s_3
act ↓			
a	5	5	4
b	6	1	6
c	0	4	1

$EU(a) = \frac{4}{7}5 + \frac{1}{7}5 + \frac{2}{7}4 = 4.714$,

and compute $\quad EU(b) = \frac{4}{7}6 + \frac{1}{7}1 + \frac{2}{7}6 = 5.286$

$EU(c) = \frac{4}{7}0 + \frac{1}{7}4 + \frac{2}{7}1 = 0.857$

Thus if informed that $\{s_1, s_2, s_3\}$ you would choose b and have an expected utility of 5.286.

(b.2) If you received information $\{s_4, s_5\}$ you will update you beliefs as follows:

probability	$\frac{3}{5}$	$\frac{2}{5}$
state →	s_4	s_5
act ↓		
a	2	2
b	1	1
c	5	0

$EU(a) = \frac{3}{5}2 + \frac{2}{5}2 = 2$,

and compute $\quad EU(b) = \frac{3}{5}1 + \frac{2}{5}1 = 1$

$EU(c) = \frac{3}{5}5 + \frac{2}{5}0 = 3$

Thus if informed that $\{s_4, s_5\}$ you would choose c and have an expected utility of 3.

(b.3) The probability of being informed that $\{s_1, s_2, s_3\}$ is $\frac{1}{3} + \frac{1}{12} + \frac{1}{6} = \frac{7}{12}$ and the probability of

being informed that $\{s_4, s_5\}$ is $\frac{1}{4} + \frac{1}{6} = \frac{5}{12}$. Hence the expected utility of acquiring information is

$\frac{7}{12}5.286 + \frac{5}{12}3 = 4.33$. **Hence acquiring information increases your expected utility from**

3.583 to 4.33.