

**PRACTICE THIRD MIDTERM EXAM**

1. You are taking a course that was taught many times in the past. So far 10,000 students have taken it. The only grades given in this course are As and Bs (no + or -). In the past the instructor has always given As to 20% of the class. The instructor gives a midterm that she grades as either "Pass" (P) or "Fail" (F). In the past, of the students who received an A in the course, 75% had received a P in the midterm. Of the students who received a B in the course, 50% had failed the midterm.

(a) Fill in the following table for the 10,000 students who took this course in the past.

Total number of students	10,000
Number of students who got an A	
Number of students who got a B	
Number of students who got P in midterm and A in the course	
Number of students who got F in midterm and A in the course	
Number of students who got P in midterm and B in the course	
Number of students who got F in midterm and B in the course	

(b) At the very beginning of the course, what is the probability that you will get an A?

(c) If you get a P in the midterm, how likely is it that you will get an A?

(d) If you get an F in the midterm, how likely is it that you will get a B?

(e) At the beginning of the course, what is the probability that you will get a P in the midterm and an A in the course?

2. Ann is an exponential discounter with parameter  $\delta = 0.9$ , while Christina's intertemporal preferences are represented by a utility function with hyperbolic discounting with parameters  $\beta = 0.7$  and  $\delta = 0.8$ . Ann and Christina share the same instantaneous utility: for any amount of money  $\$m$ , their instantaneous utility at any date  $t$  is  $u_t(m) = \sqrt{m}$ . A time period represents a year.

- (a) Today Ann is given a choice between receiving  $\$100$  in 4 years' time or  $\$400$  in 6 years' time. What does she choose?
- (b) Today Christina is given a choice between receiving  $\$100$  in 4 years' time or  $\$400$  in 6 years' time. What does she choose?
- (c) After 4 years Ann is asked to either confirm the choice she made 4 years ago or change her choice (that is, she is asked whether she chooses  $\$100$  right away or  $\$400$  after two years). What does she choose?
- (d) After 4 years Christina is asked to either confirm the choice she made 4 years ago or change her choice (that is, she is asked whether she chooses  $\$100$  right away or  $\$400$  after two years). What does she choose?
- (e) Are Ann's preferences time consistent?
- (f) Are Christina's preferences time consistent?

3. You are facing the following decision problem, where the numbers are von Neumann-Morgenstern utilities:

probability	$\frac{1}{3}$	$\frac{1}{12}$	$\frac{1}{6}$	$\frac{1}{4}$	$\frac{1}{6}$
state $\rightarrow$	$s_1$	$s_2$	$s_3$	$s_4$	$s_5$
act $\downarrow$					
$a$	5	5	4	2	2
$b$	6	1	6	1	1
$c$	0	4	1	5	0

- (a) What action will you choose?
- (b) Suppose you are offered partial information, represented by the partition  $\{\{s_1, s_2, s_3\}, \{s_4, s_5\}\}$ .
  - (b.1) What action will you choose if you receive information  $\{s_1, s_2, s_3\}$ ?
  - (b.2) What action will you choose if you receive information  $\{s_4, s_5\}$ ?
  - (b.3) By how much does your utility increase if the above information is made available to you for free, relative to the case of no information?