Homework 1

Due May 17 at 11:59pm **Points** 20 **Questions** 9
Available May 15 at 9:30am - May 17 at 11:59pm 3 days **Time Limit** None
Allowed Attempts Unlimited

Take the Quiz Again

Attempt History

	Attempt	Time	Score
KEPT	Attempt 5	less than 1 minute	15 out of 20
LATEST	Attempt 5	less than 1 minute	15 out of 20
	Attempt 4	less than 1 minute	13.67 out of 20
	Attempt 3	10 minutes	13.67 out of 20
	Attempt 2	12 minutes	14.33 out of 20
	Attempt 1	10 minutes	3 out of 20

Correct answers are hidden.

Score for this attempt: **15** out of 20
Submitted May 17 at 11:35pm
This attempt took less than 1 minute.

Question 1

2 / 2 pts

[**CS04-01**] Which one(s) of the following operators are reversible?

- [x] IDENTITY
- [x] NOT
- [ ] ZERO
- [ ] ONE

Question 2

2 / 2 pts

[**CS08-01**] You are given a classical biased coin with probability of heads 0.2 and probability of tails 0.8. The coin is flipped for 1000 times. What is the most likely outcome?

- (•) Heads: 203 Tails: 797
- ( ) Heads: 102 Tails: 898
- ( ) Heads: 320 Tails: 680
- ( ) Heads: 500 Tails: 500

Question 3

2 / 2 pts

[**CS20-02**] Given a probabilistic system with states {1,2,3,4} and operator,

$$A = \begin{pmatrix} 0.1 & 0.2 & 0.3 & 0.4 \\ 0.9 & 0 & 0 & 0 \\ 0 & 0.8 & 0 & 0 \\ 0 & 0 & 0.7 & 0.6 \end{pmatrix}$$

what is the probability of going from state 2 to state 3?

0.8

Question 4

2 / 2 pts

[**CS20-01**] Which statements are true for probabilistic operators.

- [x] Column sum adds up to 1.
- [x] All entries are real.

- [x] All entries are non-negative.
- [ ] Row sum adds up to 1.
- [ ] All entries should be positive.

Incorrect

Question 5

0 / 2 pts

[**CS24-01**] If we have two probabilistic bits whose state is represented by the vectors, $\begin{pmatrix} 0.2 \\ 0.8 \end{pmatrix}$ and $\begin{pmatrix} 0.9 \\ 0.1 \end{pmatrix}$, what is the probability of observing state 10?

0.16

Question 6

2 / 2 pts

[**CS08-02**]If we want to simulate a biased coin with probability of heads=0.7, what should be the value of x in the following code?

```
heads = tails = 0
for i in range(1000):
        if randrange(100) < x:
            heads = heads + 1
        else:
            tails = tails + 1
```

70

Question 7

2 / 2 pts

[**CS24-02**] What is the dimension of the vector representing a system with 3 coins?

- (●) 8
- ( ) 3
- ( ) 6
- ( ) 9

Question 8

3 / 3 pts

[CS16- 01] Mark the vectors which represent valid probabilistic states.

- [x] (1/2 1/2 0 0)
- [ ] (-1/2 1/4 1/4 0)
- [x] (1/3 2/3 0)
- [ ] (1/5 1/5 1/5 2/5 -1/5)
- [x] (1 0 0 0)

Incorrect

Question 9

0 / 3 pts

[CS12-01] You are given the following probabilistic operator :

$$\begin{pmatrix} 0.2 & 0.4 \\ 0.8 & 0.6 \end{pmatrix}$$

Suppose that we represent the weather being sunny with state 0 and rainy with state 1. The transition probabilities can be interpreted as follows:

- If today is sunny, the probability that tomorrow is sunny is 0.2

- If today is sunny, the probability that tomorrow is rainy is 0.8

- If today is rainy, the probability that tomorrow is sunny is 0.4

- If today is rainy, the probability that tomorrow is rainy is 0.6

Given that it is sunny on Monday, what is the probability that it will be rainy on Wednesday?

(Write the probability as a decimal number e.g. 0.3)

0.24

Quiz Score: **15** out of 20