Problem-set II

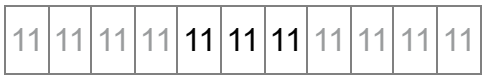
Started: Apr 22 at 11:34pm

Quiz Instructions

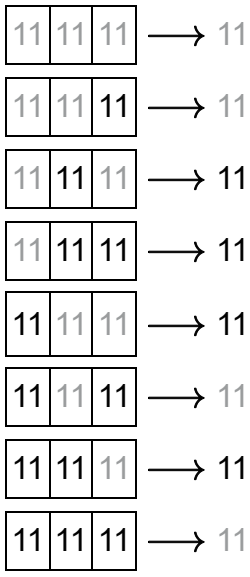
You are allowed to collaborate with up to 3 of your colleagues on this problem-set. **Nevertheless, each student needs to submit independently.** Each submission does not need to be the same among the collaborators. Unless you did not collaborate with any of your colleagues, please make sure to also submit the Problem-set II accompanying survey with info about your collaborators once finished (**Problem-set II - Accompanying SURVEY (https://fresnostate.instructure.com/courses/66022/quizzes/246633)**). Good luck and try to also have fun :)

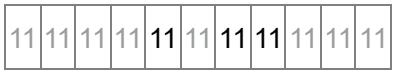
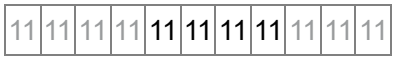
Question 1 — 0.5 pts

Consider an elementary cellular automaton. What will the next line be?



Given that:



- (●) 
- ( ) 

11	11	11	11	11	11	11	11	11	11	11

11	11	11	11	11	11	11	11	11	11	11

Question 2

0.5 pts

Consider the following evolution of an elementary automaton (time progresses from up to down). What will the next line be?

11	11	11	11	11	00	11	11	11	11	11
11	11	11	11	00	00	00	11	11	11	11
11	11	11	00	00	11	00	00	11	11	11
11	11	00	00	00	11	00	00	00	11	11

11	00	00	11	00	11	00	11	00	00	11

11	11	00	11	00	11	00	11	00	11	11

11	00	00	00	00	00	00	00	00	00	11

11	00	00	00	00	11	00	00	00	00	11

Question 3

0.5 pts

Cellular automata produce:

a) random patterns
b) pseudo-random patterns

a)

◉ b)

Question 4 — 0.5 pts

Convert the rectangular coordinates (2, 4, 8) into their equivalent spherical coordinates in the Physical system using degrees.

- ◉ (9.17, 29.21°, 63.43°)
- ○ (8.77, 28.27°, 46.51°)
- ○ (9.77, 27.78°, 26.71°)
- ○ (18.76, 24.56°, 76.71°)

Question 5 — 0.5 pts

Convert the spherical coordinates (4, 24°, 25°) that use the Physical system in degrees into their equivalent Cartesian coordinates. Give the z coordinate.

3.65

Question 6 — 0.5 pts

Convert the spherical coordinates (4, 34°, 25°) that use the Physical system in degrees into their equivalent Cartesian coordinates. Give the x coordinate.

2.027

Question 7

0.5 pts

Convert the spherical coordinates (4, 34°, 25°) that use the Physical system in degrees into their equivalent Cartesian coordinates. Give the y coordinate.

0.94

Question 8

0.5 pts

Convert the spherical coordinates (4, 34°, 25°) that use the Physical system in degrees into their equivalent Cartesian coordinates. Give the z coordinate.

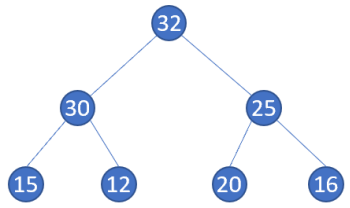
3.31

Question 9

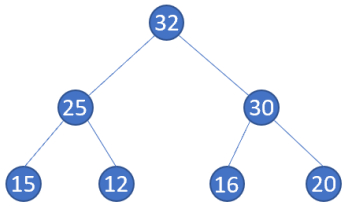
0.5 pts

The elements 32, 15, 20, 30, 12, 25, 16 are inserted one by one in the given order into a Max Heap. The resultant Max Heap is:

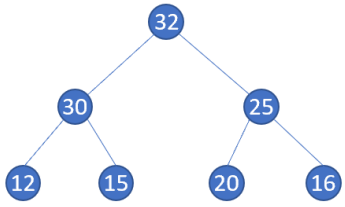
a)



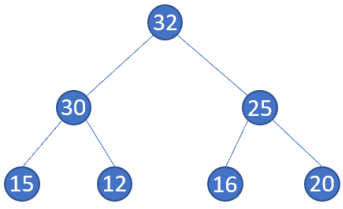
c)



b)



d)



◉ a

- ◯ b
- ◯ c
- ◯ d

Question 10

0.5 pts

Match the logical model category with the most relevant description.

White Box	A model of a complex dynan
Gray Box	Intermediate models combin
Black Box	Models that are phenomeno

Question 11

0.5 pts

Time \ State	Continuous	Discrete
Continuous	a)	d)
Discrete	b)	c)

Given the following examples, choose which one best fits every box.

1. An equation describing the movement of a comet in space.

2. A model describing the evolution of yearly average extra-terrestrial radiation.

3. A model describing the evolution of human population.

4. A model describing the progression of a backgammon game.

a) [Choose]

b) [Choose]

c) [Choose]

d) [Choose]

Question 12

0.5 pts

Imagine that we set up a simulation of a factory producing thingamabobs. In the real world, the factory produces 8 thingamabobs in 6 hours. In our simulation the factory produces 8 thingamabobs in half the time. Consider running the simulation for 2 hours. What is the runtime of the simulation?

- (●) 2 hours
- ( ) 6 hours
- ( ) 5.3 hours
- ( ) 3 hours

Question 13

0.5 pts

A point particle in an infinite 2D space, no forces:

$$x(t+\Delta t) = v_x \Delta t + x(t)$$

$$y(t+\Delta t) = v_y \Delta t + y(t)$$

The trajectory can be accurately computed at each time in the future (or even in the past).

If the particle at $t = 0$ is at position $(1,\ 4)$ with $v = (3,\ 2)$, identify its position after 60 units of time (i.e., $\Delta t = 60$).

- ○ (122, 63)
- ◉ (181, 124)
- ○ (2, 3)
- ○ (0, 0)

Question 14

0.5 pts

Following the crosswalk example discussed in class (slides 20-27, 12. From Modelling to Simulation.pdf), at what time the last event happens in the following simulation if the model parameters are: a=50, b=100.

Time	S	Q
0	f="RED", C=0	<pedestrian,134>, <pedestrian,167>, <pedestrian, 260>, <pedestrian, 340>, <pedestrian, 345>

Question 15

0.5 pts

Following the crosswalk example discussed in class (slides 20-27, 12. From Modelling to Simulation.pdf), at what time the last event happens in the following simulation if the model parameters are: a=50, b=100.

Time	S	Q
0	f="RED", C=0	<pedestrian, 100>, <pedestrian, 110>, <pedestrian, 120>, <pedestrian, 130>, <pedestrian, 140>, <pedestrian, 150>, <pedestrian, 160>, <pedestrian, 170>, <pedestrian, 180>, <pedestrian, 190>

Question 16

0.5 pts

Convert the spherical coordinates (4, 24^o, 25^o) that use the Physical system in degrees into their equivalent Cartesian coordinates. Give the x coordinate.

1.47

Saving... Submit Quiz