# CMPE 353 AI: Midterm Examination
# 4 DEC 2021

## Name & Surname:
## ID:
## Signature:

## PART- A
## ! Please mark your answer in the table
**(each question in PART-A is 5 points )**

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |

**Q1)** Which question is Artificial Intelligence most interested in?

A. Can we use the internet to obtain a powerful distributed artificial system
B. Can machines behave intelligently?
C. Can people behave intelligently using computers?
D. Can we improve intelligently efficiency of data storage in a system
E. Can we improve the quality of the software engineering process

**Q2)** When did artificial intelligence first begin to be discussed (hint: first conceptual design of neural nets)?

A. 1800-1850
B. 1850-1915
C. 1940-1960
D. 1990-2000
E. 2010-2020

**Q3)** Which one can the field of artificial intelligence benefit from?

A. Philosophy
B. Mathematic
C. Neuroscience
D. Linguistics
E. All of the above

**Q4)** What does PEAS mean when evaluating an AI agent

A. PEAS: Price, Ethic, Actuators, Score
B. PEAS: Priority, Environment, Actuators, Sensors
C. PEAS: Performance measure, Environment, Actuators, Sensors
D. PEAS: Perspective, Examination, Actions, Statistics
E. PEAS: Phase, Entity, Actuators, Standards

**Q5)** Which one has ***discrete*** environment type

A. Driving Car
B. The part-picking robot
C. Playing Chess
D. Home cleaning Robots
E. AI Drones for package delivery

**Q6)** A rational utility-based agent chooses the action that

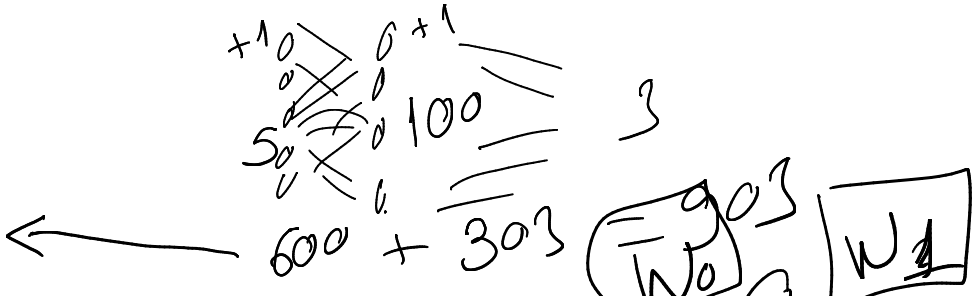
A. Maximizes the expected utility of the action outcomes
B. Achieves a simple goal
C. Achieves many goals in the list
D. Achieve a goal by learning
E. Achieve a goal as fast as possible

**Q7)** Which one is correct for the wumpus world

A. Fully observable
B. Continuous rather than discrete
C. It is not deterministic
D. It is dynamic
E. It is static

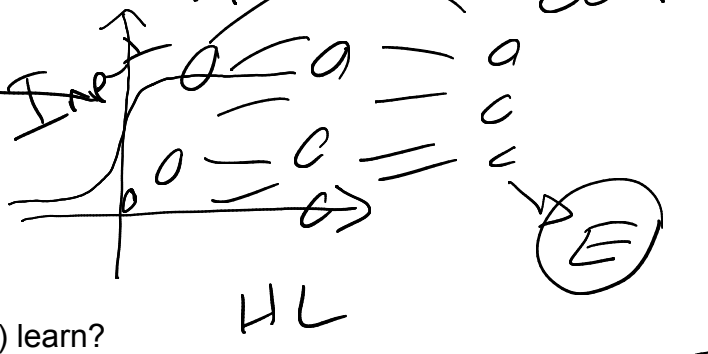
**Q8)** How many parameters (weights) approximately exist in a Multilayer Perceptron with 5 inputs, on a single hidden layer of 100 neurons, and 3 outputs

A. 100-150
B. 200-300
C. 300-500
D. 500-600
E. 850-1000



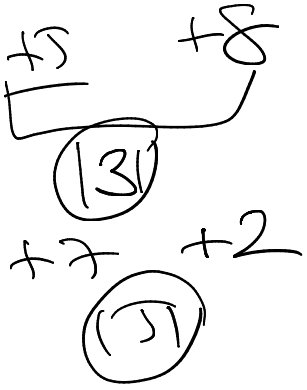
**Q9)** Which one is correct for the Sigmoid Activation Function?

A. Sig(x+1)> Sig(x)
B. Sig(0)= 0
C. Sig (x)=1 for x >0
D. Sig (1)=0
E. Sig(x)= Sig(-x)



**Q10)** How do neural networks (E.g. A Perceptron) learn?

A. The rules are given in advance, there is no learning
B. It updates the weights based on the error that occurred at the output layer
C. It randomly changes the parameters at every step
D. The weights are transferred from other trained models.
E. Using the correlation between the input examples



# PART -B

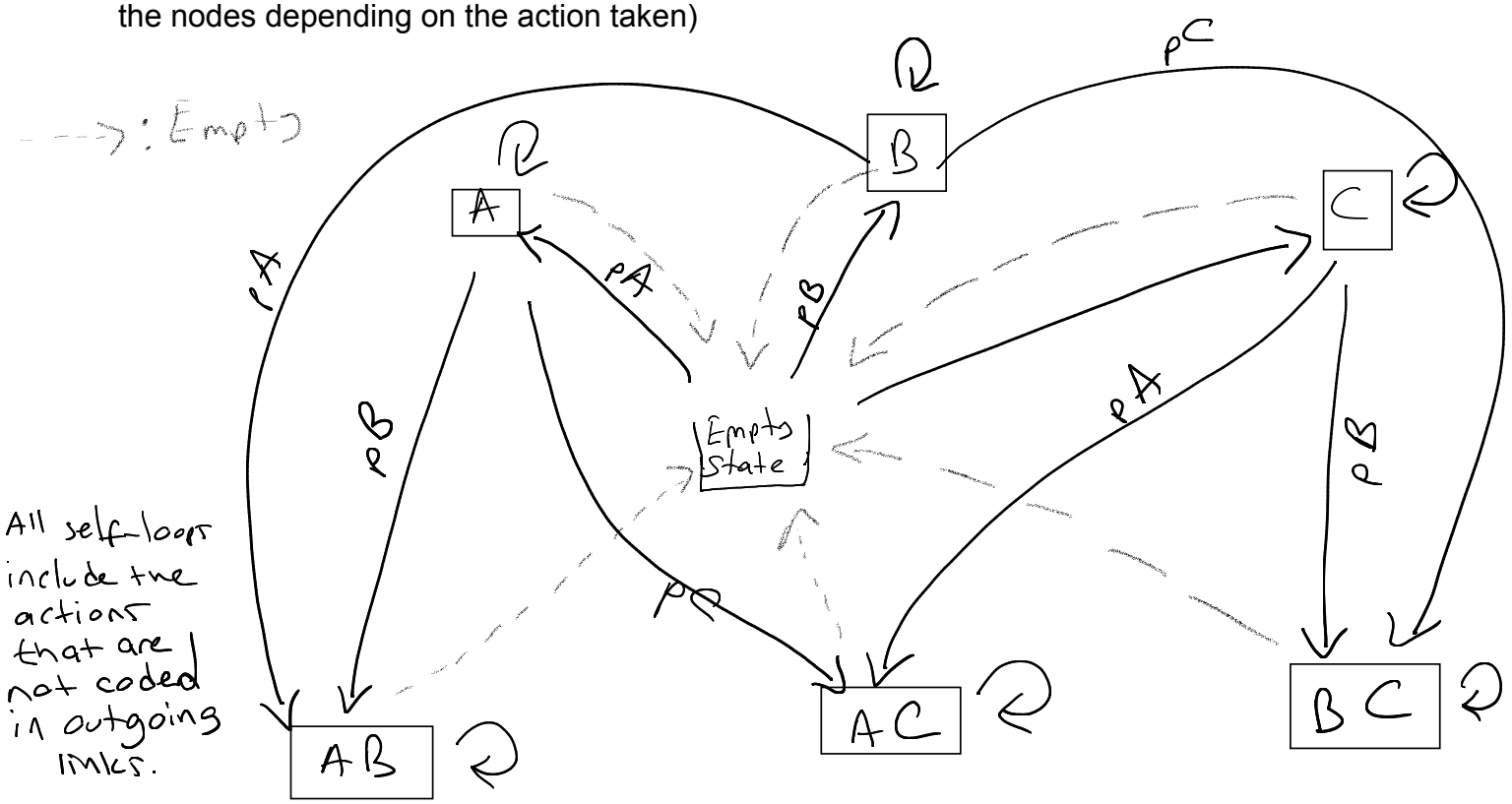
**Q11)** Fill the table accordingly **(10 points)**

| P | Q | P -> Q | P <-> Q |
|---|---|---|---|
| 0 | 0 | 1 | 1 |
| 0 | 1 | 1 | 0 |
| 1 | 0 | 0 | 0 |
| 1 | 1 | 1 | 1 |

**Q12) Garbage Agent World (20 points):** Suppose we have a garbage agent with the following properties:

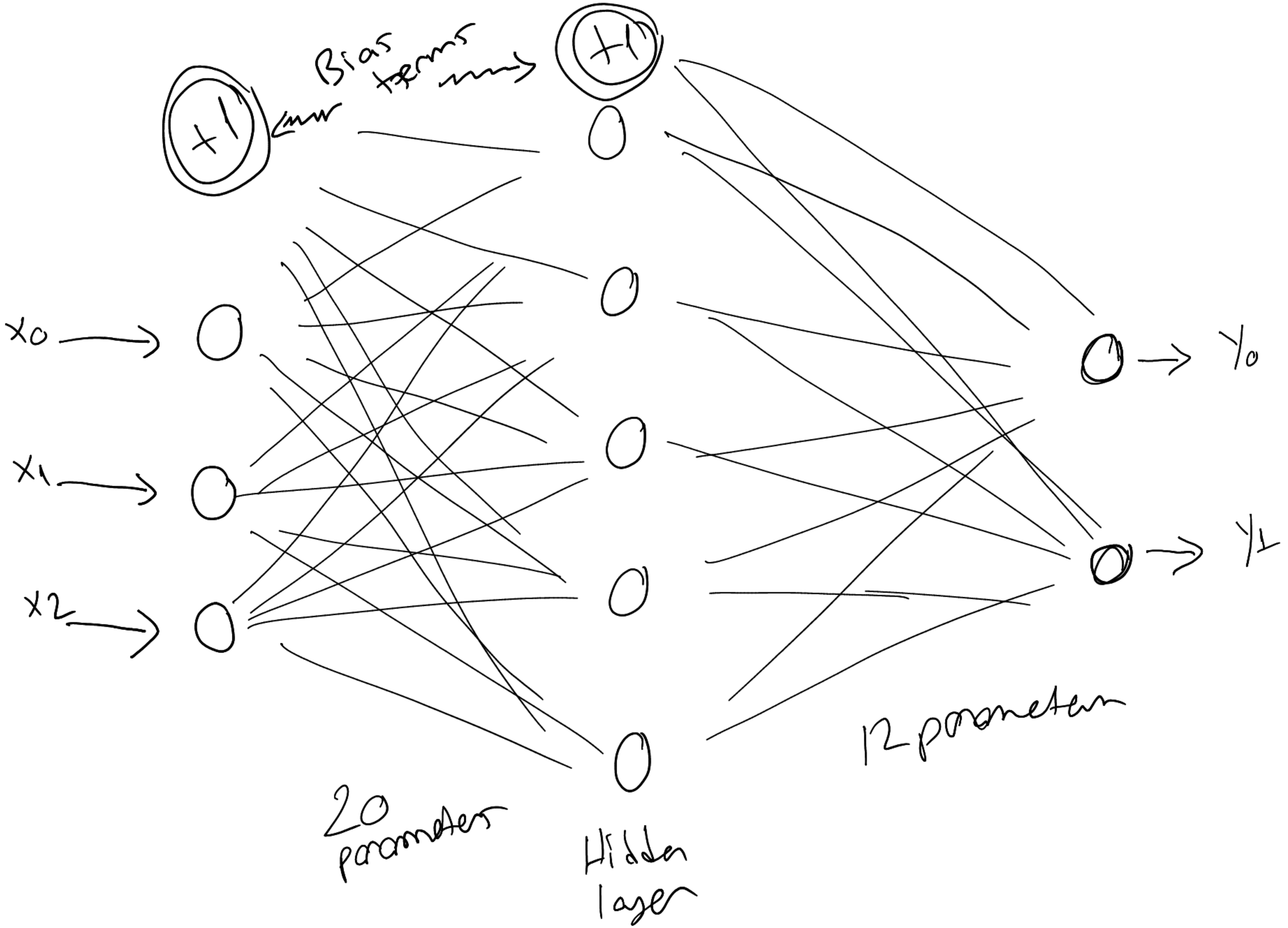
- The garbage agent can **put** items (A, B, or C) on a garbage box.
- There are only three items (A, B, C) to be put.
- Agents can **empty** (flip-over and pour) the box. There is no removal of any selected item. The entire box will be cleaned upon taking ***Empty*** action.
- The box capacity is only two. No three items fit in the box.
- If there are already two items in the box, any **Put** action cannot operate.
- The items in the box are unordered, which means (a,b) = (b,a)
- The actions are **Put A, Put B, Put C,** and **Empty** (flip-over and pour).

***Draw*** a state-space graph (hint: draw all possible states first and make connections between the nodes depending on the action taken)




**Q12)** Draw a Multilayer Perceptron with 3 inputs, on a single hidden layer of 5 neurons, and 2 outputs **(20 points)**

**Draw your model on the back of the paper!**


+1
Bias terms
+1
$x_0$
$x_1$
$x_2$
$y_0$
$y_1$
20 parameters
Hidden layer
12 parameters