

Question 4

4d) $x_1 = 0.8$

$$x_2 = -0.22$$

$$x_3 = 0.12$$

$$0.8 \times 0.1 = 0.08$$

$$-0.22 \times -0.4 = 0.088$$

$$0.12 \times 0.22 = 0.0264$$

$$\Sigma = 0.1944$$

$$+ \text{Bias} = 0.4944$$

$$\text{ReLU } y = \phi x + \phi$$

$$\phi(y) = 0.4944$$

$$\text{logistic } \phi(y) = \frac{1}{1 + e^{-0.4944}}$$

$$= \frac{1}{1 + \frac{1}{e^{0.4944}}}$$

$$= \frac{1}{1.609937}$$

$$= 0.621142$$

We use ReLU over logistic functions as they are ~~even~~ simple and fast to compute. They also do not suffer from the vanishing gradient as some of the other functions, as all functions must be differentiable at all points.

Question 1

1a) $\{ \text{BMI} = \text{Medium}, \text{Age} = \text{Lower}, \text{Gender} = \text{Male} \}$

$$P(\text{BMI} = \text{Medium} | \text{Yes}) = \frac{4}{9}$$

$$P(\text{Age} = \text{Lower} | \text{Yes}) = \frac{6}{9}$$

$$P(\text{Gender} = \text{Male} | \text{Yes}) = \frac{6}{9}$$

$$P(\text{Yes}) = \frac{9}{14}$$

$$P(\text{Yes} | \text{Medium, Lower, Male}) = \frac{4}{9} \times \frac{6}{9} \times \frac{6}{9} \times \frac{9}{14}$$

$$= 0.12698$$

$$P(\text{BMI} = \text{Medium} | \text{No}) = \frac{1}{5}$$

$$P(\text{Age} = \text{Lower} | \text{No}) = \frac{1}{5}$$

$$P(\text{Gender} = \text{Male} | \text{No}) = \frac{1}{5}$$

$$P(\text{No}) = \frac{5}{14}$$

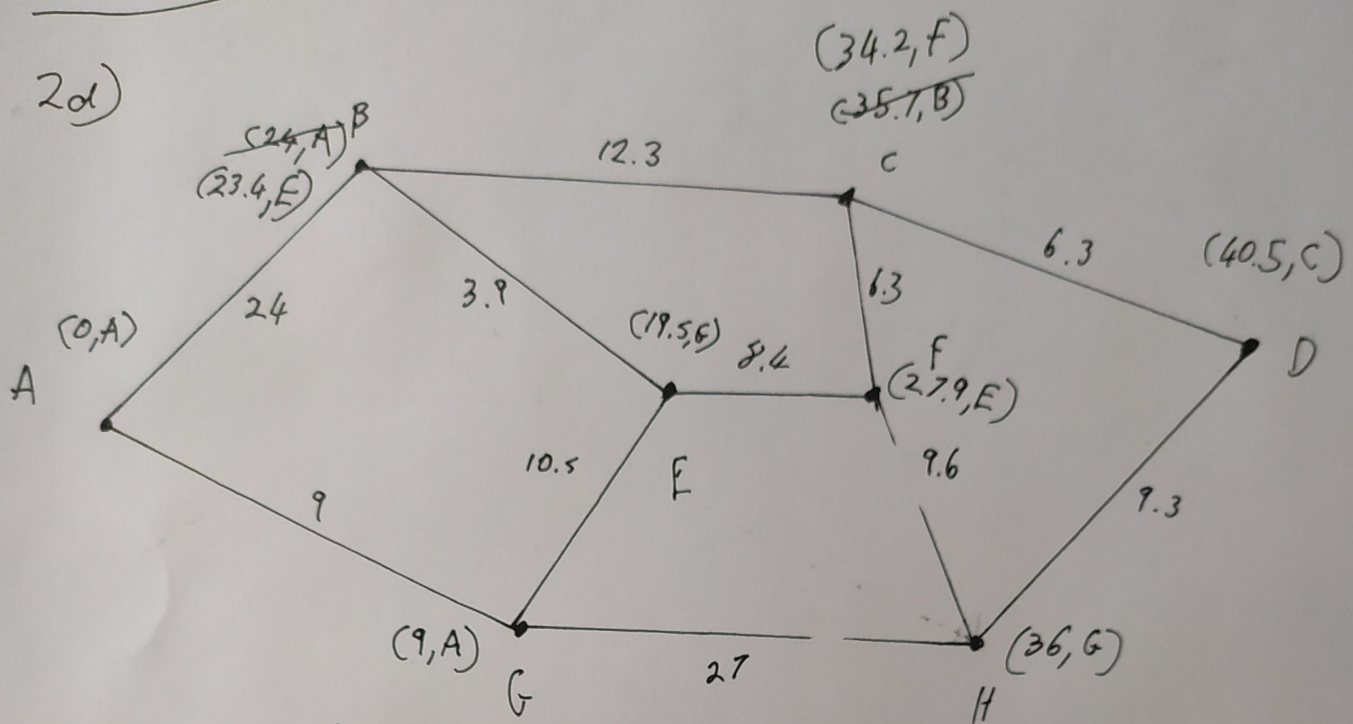
$$P(\text{No} | \text{Medium, Lower, Male}) = \frac{1}{5} \times \frac{1}{5} \times \frac{1}{5} \times \frac{5}{14}$$

$$= 0.00285$$

Probability of OSA = Yes is more likely.

Question 2

2d)



Open: $[B, F], [F, B, H], [B, F, H], [F, H], [H, D], [H, D], [D]$

Closed: A, G, E, B, F, C, H, D