

**SURNAME:**

Gaylord

FORENAME(S):

Benjamin

12 Pages

1. Please give the information requested in the boxes below.
2. Enter your name in the space provided to the right, fold over and seal down (using the label provided) to hide your name.
3. The answers must be legibly written. The Examiners can either ignore illegible answers or mark them as read and the expense of typing charged to the candidate.
4. Write your answers in ink.
5. Begin each answer on a fresh page. Do all rough work in the answer book and cross it through.
6. No part of this book is to be torn out; it must be handed in complete.
7. If more books than one are used, fasten them together using the tags available from the invigilator(s).
8. **Every book must be handed in. In no circumstances may answer books, used or unused, be taken out of the examination venue.**

1	Student Number	2003557
2	Title of Examination Paper	AI + machine learning
3	Module Code	Acca6011
4	Date and Time of Examination	8/1/24 9AM
5	Examination Venue	IQ301A
6	Seat Number	
7	Number of Answer Books handed in	

[illegible]

(Gweler yr ochr arall am y fersiwn Cymraeg)

$$\begin{array}{r} 43.5 \\ \hline 75 \end{array} \quad 58\% \quad \begin{array}{r} 75 \\ \hline \end{array}$$

1) a) ~~Skill~~ = Your Skill = Medium
 Opponent's Skill = High
 Opponent's Ranking = Normal
 Your Ranking = High.

Win = ~~9/15~~ Yes = 9/15.

Your Skill = 4/9

Opponent's Skill = 2/9

Opponent's Ranking = 6/9

Your Ranking = 3/9.

$$9/15 \times 4/9 \times 2/9 \times 6/9 \times 3/9 =$$

$$\cancel{0.6 \times 0.444 \times 0.222 \times 0.333} =$$

$$\cancel{0.01}$$

$$\cancel{0.6 \times 0.4444444444 \times 0.2222222222 \times 0.3333333333} =$$

$$\cancel{0.01975308641}$$

~~Win = No = 6/15~~

~~Your Skill = 1/6~~

~~Opponent Skill = 2/6~~

~~Opponent Ranking = 2/6~~

~~Your Ranking = 4/6~~

2/0
N

$$0.6 \times 0.444 \times 0.222 \times 0.667 \times 0.333 =$$

$$\frac{16}{1215} = 0.013$$

Win = No = 6/15

Your Skill = 1/6

Opponent Skill = 2/6

Opponent Ranking = 2/6

Your Ranking = 4/6

$$6/15 \times 1/6 \times 2/6 \times 2/6 \times 4/6 =$$

$$0.4 \times 0.167 \times 0.333 \times 0.333 \times 0.667 =$$

$$\frac{2}{405} = 0.005$$

0.013 is greater than 0.005 so a win is likely

All ~~Answer~~ Answers are given to 3 D.P.

b)

%

$$Q1 = \frac{20}{25}$$

$$\begin{array}{r} 0 \\ 1 \\ 5 \\ \hline 20 \\ 25 \end{array}$$

3)

a)

$$\frac{0}{1}$$

$$0/7$$

b)

$$\frac{0}{2}$$

$$0/2$$

c)

$$\begin{aligned} \text{Inputs} &= x_1 = 0.9 \\ x_2 &= -0.42 \\ x_3 &= 0.02 \\ W_{k1} &= 0.2 \\ W_{k2} &= -0.3 \\ W_{k3} &= 0.42 \\ \text{Bias} &= 0.2. \end{aligned}$$

$$\begin{aligned} x_1 \times W_{k1} &= 0.9 \times 0.2 = 0.18 \\ x_2 \times W_{k2} &= -0.42 \times -0.3 = 0.126 \\ x_3 \times W_{k3} &= 0.02 \times 0.42 = 0.0084. \end{aligned}$$

$$0.18 + 0.126 + 0.0084 + 0.2.$$

$$\text{Output } (y) = 0.8144$$

$$\phi(y) = \frac{1}{1 + e^{-y}} = 0.6930463242.$$

$$d = 0/6 \quad \phi = 7/10$$

$$d = 0/6$$

$$\phi = \frac{0.7}{2.5}$$

4)

A)

$$\frac{0}{4}$$

$$4 \text{ as } \frac{0}{4}$$

b) First defuzzification techniques is the Centroid Defuzzification method.

$$\frac{1}{3}$$

$$4b \frac{1}{3}$$

c) Breathlessness = 12
Wheeziness = 6

OR = max
And = min.

$$\mu_{\text{Moderate breathless}}(12) = \frac{x-10}{5} = \frac{12-10}{5} = 0.4 \checkmark$$

$$\mu_{\text{Infrequent breathless}}(12) = \frac{15-x}{5} = \frac{15-12}{5} = 0.6 \checkmark$$

$$\mu_{\text{frequent breathless}}(12) = 0 \checkmark$$

$$\mu_{\text{Mild Wheeziness}}(6) = \frac{7-x}{2} = \frac{7-6}{2} = 0.5 \checkmark$$

$$\mu_{\text{Severe Wheeziness}}(6) = \frac{x-5}{5} = \frac{6-5}{5} = 0.2 \checkmark$$

Rule 1 = breathlessness frequent OR

Wheeziness is Severe =

Rule 2 = μ breathless frequent = 0 OR

μ Severe wheeziness = 0.2

Rule 3 = Higher number is 0.2. high

Confidence ✓

Rule 2 = breathlessness moderate And

Wheeziness is mild. =

μ breathless moderate = 0.4

μ mild wheeziness = 0.5

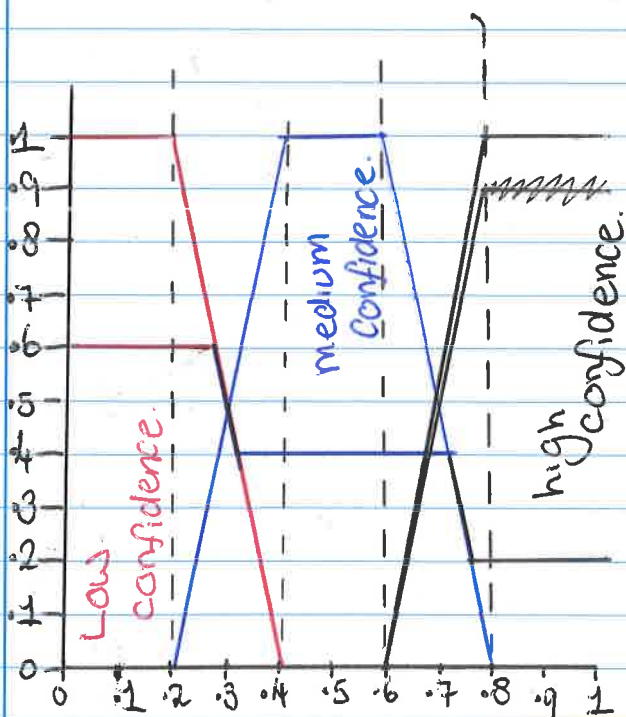
Lower number is 0.4 medium

Confidence ✓

Rule 3 = breathlessness is infrequent =

0.6 low

Confidence. ✓



0	0.6
0.1	0.6
0.2	0.6
0.3	0.4
0.4	0.4
0.5	0.4
0.6	0.4
0.7	0.4
0.8	0.2
0.9	0.2
1	0.2

$$(0 + 0.1 + 0.2) \times 0.6 + (0.3 + 0.4 + 0.5 + 0.6) \times 0.4 + (0.7) \times 0.2$$

$$(0.3) \times 0.6 + (2.5) \times 0.4 + (2.7) \times 0.2$$

$$0.0972$$

? (Not sure the rest of equation)

$$\begin{array}{r} 165 \\ \hline 25 \end{array}$$

$$\begin{array}{r} 165 \\ \hline 25 \end{array}$$