CS 6375

ASSIGNMENT \_\_\_1\_\_\_\_\_\_\_\_\_

Names of students in your group:

Harrison Jansma

Number of free late days used: \_\_\_\_\_\_0\_\_\_\_\_\_\_\_\_\_\_\_\_\_   
Note: You are allowed a **total** of 4 free late days for the **entire semester**. You can use at most 2 for each assignment. After that, there will be a penalty of 10% for each late day.

Please list clearly all the sources/references that you have used in this assignment.

Part 1

1.a Y = (¬A ∨ B) ∧ ¬(C ∧ A) where ¬ represents the NOT operator

A = 1?

Yes.

B = 1?

Yes.

C = 1?

Yes.

1.b. Y = (A ⊕ B) ∧ C where the symbol ⊕ represents the XOR logical operator

C = 1?

Yes.

B = 1?

A = 1?

Yes.

B = 1?

Yes.

1.c. Y = (A ∨ B) ∧ (B ∨ C) ∧ (A ∨ C)

B = 1?

A = 1?

Yes.

B = 1?

Yes.

C = 1?

C = 1?

1.d. Y = (A ∨ B) ∧ ¬A ∧ ¬B where ¬ represents the NOT operator

2.

VARIABLE SPLIT #1

Initial Entropy = -.5\*log(.5) -.5\*log(.5) = 1

**Variable X1:**

Entropy Child1: -.8\*log(.8) -.2\*log(.2) = 0.722

Entropy Child2: -.2\*log(.2) -.8\*log(.8) = 0.722

Information Gain: 1 – 0.5\*(0.722) –0.5\*(0.722) = 0.278

Variable X2:

Entropy Child1: -.428\*log(.428) -.571\*log(.571) = 0.985

Entropy Child2: -.666\*log(.666) -.333\*log(.333) = 0.918

Information Gain: 1 – 0.7\*(0.985) –0.3\*(0.918) = 0.034

**Variable X3: THIS ONE**

Entropy Child1: -.625\*log(.625) -.375\*log(.375) = 0.9544

Entropy Child2: -.0\*log(.0) -1\*log(.1) = 0

Information Gain: 1 – 0.8\*(.9544) –0.2\*(0) = 0.278

**VARIABLE SPLIT #2 (X3=0)**

Initial Entropy = 0.9544

**Variable X1: This One**

Entropy Child1: -.25\*log(.25) -.75\*log(.75) = .811

Entropy Child2: -1\*log(1) -.0\*log(0) = 0

Information Gain: 0.9544 – 0.5\*(0.811) –0.5\*(0) = 0.549

Variable X2:

Entropy Child1: -.5\*log(.5) -.5\*log(.5) = 1

Entropy Child2: -1\*log(1) -0\*log(0) = 0

Information Gain: 0.9544 – 0.75\*(1) –0.25\*(0) = 0.204

**VARIABLE SPLIT #3 (X3 and X2=0)**

Initial Entropy = 0.8113

**Variable X2:**

Entropy Child1: -0\*log(0) -1\*log(1) = 0

Entropy Child2: -1\*log(1) -0\*log(0) = 0

Information Gain: 0.8113– 0.75\*(0) –0.25\*(0) = 0.8113

B = 1?

B = 1?

A = 1?