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CSE-4308-002

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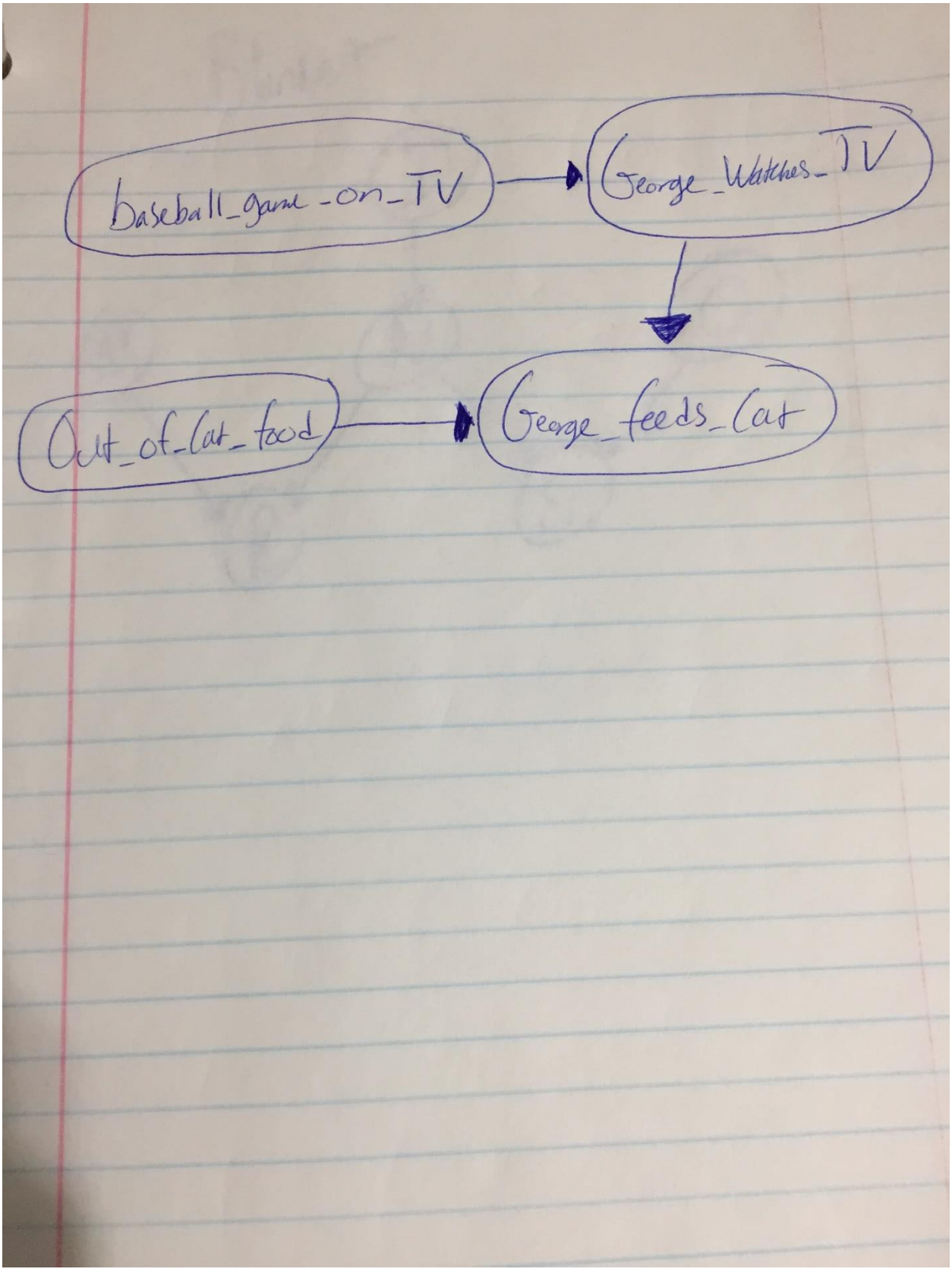
Assignment 4

1. a) $5 * 7^{10}$
   b) $5 + 7^{10}$

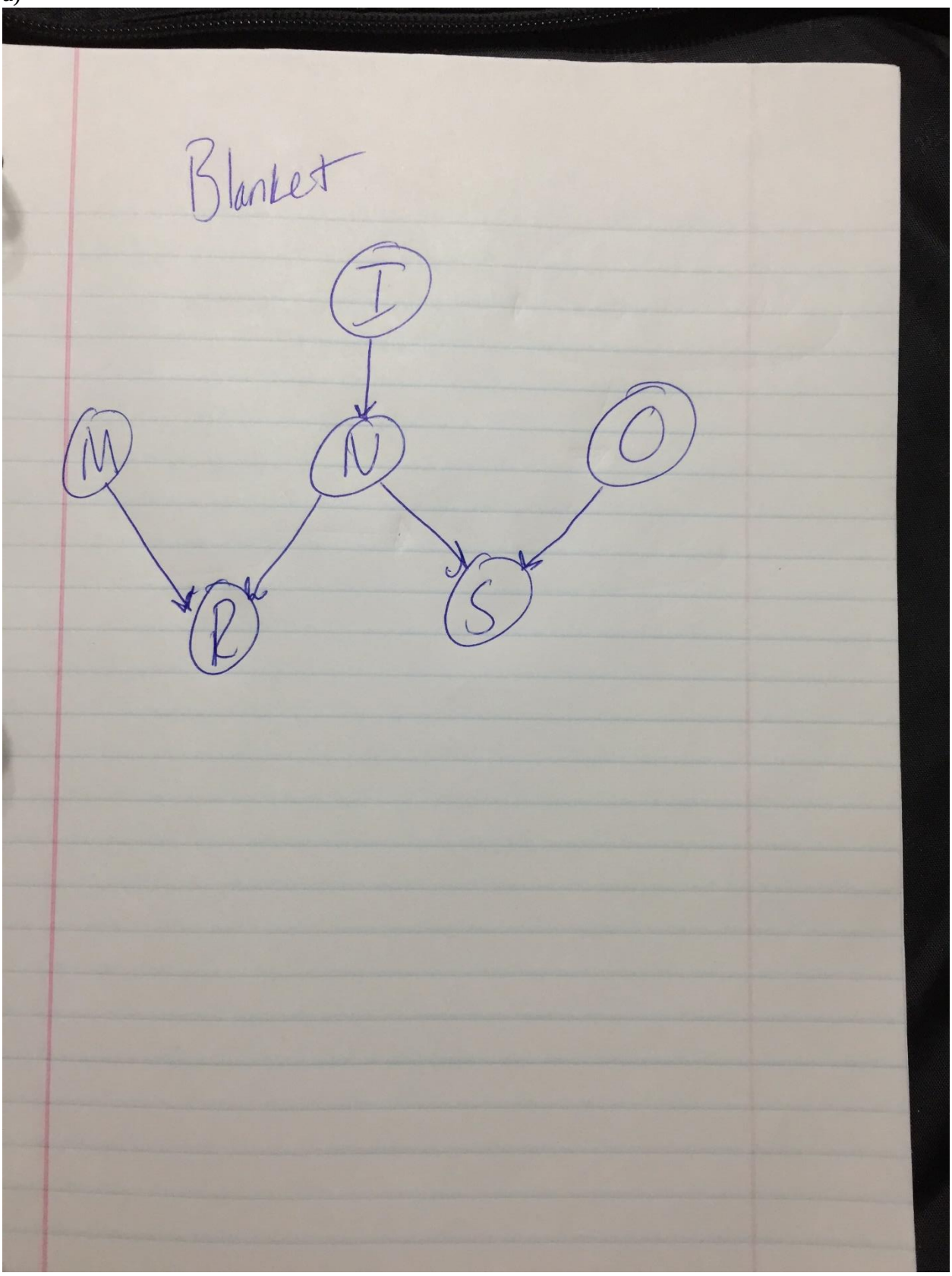
2. Programming task

3.


baseball_game_on_TV
George_Watches_TV
Out_of_Cat_food
George_feeds_Cat

4. Leaf node: George feeds the cat
   Decision tree output: No baseball game, George doesn't watch TV, George is not out of cat food, George feeds the cat

5. a)



b) (0.8*0.8)/0.8 = 0.8

c) (P(N|I) * P(not(D)) * P(I))/P(I)
(0.1*0.5)/0.5 = 0.1

6. Entropy = $-5/10\log_2(5/10) – 5/10\log_2 (5/10) = 1$

A = $1 - (3/10(-3/3\log_2(3/3) – 0)) – (4/10(-1/4\log_2(1/4) - 3/4\log_2(3/4))) - (3/10(-1/3\log_2(1/3) – 2/3\log_2(2/3))) = 0.4$

B = $1 - (4/10(-1/4\log_2(1/4) – 3/4\ \log_2(3/4))) – (4/10(-3/4\log_2(3/4) - 1/4\log_2(1/4))) - (2/10(-1/2\log_2(1/2) – 1/2\log_2(1/2))) = 0.15$

C = $1 - (5/10(-1/5\log_2(1/5) – 4/5\log_2(4/5))) – (4/10(-3/4\log_2(3/4) - 1/4\log_2(1/4))) - (0) = 0.31$

A has the highest information gain at the root

7. a)Entropy = $-80/100\log_2(80/100) – 20/100\log_2(20/100) = 0.72$

b)$0.72 – (35/100(-20/35\log_2(20/35) – 15/35\log_2(15/35)) + 65/100(-60/65\log_2(60/65) – 5/65\log_2(5/65))) = .2522$

c) 0.72

d) will wait
Node A, Node B, Node D