CPSC 340 Assignment0

1 Linear Algerba Review

1.1 Basic Operations

1. 14
2. 0
3. $\begin{bmatrix} 6 \\ 10 \\ 14 \end{bmatrix}$
4. $\sqrt[2]{5}$
5. $x^T = \begin{bmatrix} 0\ 1\ 2 \end{bmatrix}$
6. $\begin{bmatrix} 3 & 1 & 1 \\ 2 & 3 & 1 \\ 2 & 1 & 3 \end{bmatrix}$
7. $\begin{bmatrix} 6 \\ 5 \\ 7 \end{bmatrix}$

1.2 Maatrix Algebra Rules

1. True
2. True
3. True
4. False
5. False
6. True
7. False
8. True
9. True

1.3 Special Matrices

1. Symmetric Matrix - A matrix equal to its Transpspose $A^T = E$
2. Identity Matrix - An $n * n$ square matrix with ones in the main diagonal and 0's elsewhere
3. Orthogonal Matrix - A square matrix with real entries whose columns and rows are orthogonal unit vectors with $Q^T Q = QQ^T = IdentityMatrix$

2 Probablility Review

2.1 Rules of Probability

1. $\frac{1}{4}$
2. 4 dollars
3. 0.55

2.2 Bayes Rule and Conditional Probability

1. 0.010085
2. Would mostly come from the false positives
3. .00941993 = apx. .01
4. yes, it's consitent with my answer since: P(T=1) = P(T=1|D=1)(.0001*.95) + P(T=1|D=0)(.9990)(.01)
   Or .000095 + .00999 & .000095/.010085 = .00941993 , which is what I got using Bayes Rule
5. Trying to improve the accuracy of P(T=1 | D=0) would make this test more useful.

3 Calculus Review

3.1 One-variable derivatives

1. $\frac{14}{3}$ @ $x = \frac{1}{3}$
2. $\frac{1}{4}$ @ $x = \frac{1}{2}$
3. 0 @ x = 0 and x=1
4. $p(x) - 1$

3.2 Multi-variable derivatives

1. $\nabla(f) = \begin{bmatrix} 2x_1 \\ e^{x_2} \end{bmatrix}$
2. $\nabla(f) = \begin{bmatrix} (e^{x_1 + x_2 * x_3}) \\ (e^{x_1 + x_2 * x_3}) * x_3 \\ (e^{x_1 + x_2 * x_3}) * x_2 \end{bmatrix}$
3. $\nabla(f) = \begin{bmatrix} a_1 \\ a_2 \end{bmatrix}$
4. $\nabla(f) = \begin{bmatrix} 4x_1 - 2x_2 \\ -2x_1 + 2x_2 \end{bmatrix}$
5. $\nabla(f) = x$

3.3 Derivatives of code

In the code section

4 Algorithms and Data Structures review

4.1 Trees

1. 2^l
2. $2^{l+1} - 1$

4.2 Common Runtimes

1. O (n log n)
2. O (n)
1. O (log n)
2. O (nd)

4.3 Running times of code

func1: $O(n)$

func2: $O(n)$

func3: $O(1)$

func4: $O(n * n)$

In [ ]:

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