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CMPT 404 AI
Homework 0
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Exercise List

Exercise 1.

Solution. The way to solve for values of x that maximize the function, $g(x)$ is to find the derivative of $g(x)$ and to then set the derivative equal to 0 and solve. This is becuase the derivative represents the functions slope and when the slop is zero there is a relative maximum or relative minimum, to check for these we plug back in the values we get for solving $g'(x) = 0$ into $g(x)$ and check the results. In this case we see that $g'(x) = -6x^2 + 24 = 0$ when we solve for x we see that we get $x = 4$ where $g(4) = 48$.

Exercise 2.

Solution. To find the partial derivatives of $f(x)$ with respect to xo and $x1$ we basically find the derivative of $f(x)$ while treating the variable we are not solving with respect to as a constant. This yields us the following result. $f(x)$ with respect to $xo = 9xo^2 - 2x1^2$ and $f(x)$ with respect to $x1 = 4 - 4xo * x1$

Exercise 3.

Solution. These matrices cannot be multiplied together, the number of columns of the matrix on the left must be equal to the number of rows of the matrix on the right. Here we have a $[2x3] * [2x3]$ When you take the transpose of A you get a 3x2 matrix that can be multiplied by the 2x3 matrix, B. The result of this multiplication is the matrix $A^t * B = [-2, -2, 11; -8, -1, 23; 6, -3, -6]$ the rank of this result matrix is 3 because all three rows are linearly independent.

Exercise 4.

Solution. Simple Gaussian also called the normal distribution is a continuous probability distribution. It is important for our purposed when we are referring to random variables because if an event is the sum of other random events then it will follow the normal distribution. The Multivariate Gaussian distribution is can be simply thought of as the normal distribution for k-variate events. The bernoulli distribution is the probability distribution of a random variable which takes a value of 1 for probability of success and a value of 0 for probability of failure, it is only appropriate in random events with binary outcomes. The binomial distribution is the discrete probability distribution of the number of successes in a sequence of independent events. The Exponential distribution is the probability distribution that describes the time between events in a poisson process or a process in which events occur continuously and independently at a constant average rate.

Exercise 6.

Solution. I am unfamiliar with your notation N(2,3) for the expected value. However expected value is a sort of predicted cumulative average, I am familiar with the process of finding the expected value for a series of independent events with a finite number of outcomes. For example rolling a six sided die 3 times.

Exercise 7 and 8.

Solution. I joined the class on Friday afternoon so I would just need a few more days if I was going to familiarize myself with the notation and concepts these problems require an understanding of.