**HW ASSIGNMENT 3**

**DSCI - 552**

1) In this problem we will perform Maximum Likelihood Estimation to find the parameters of a Gaussian Distribution. Consider the data distribution of **n** one dimensional points. Let them be denoted by the variable **X**. Then, if we assume they come from a Gaussian Distribution with mean and Variance **V**, **X** comes from the probability distribution:

P(x | , V) **=**

Apply MLE on the above equation by using the following hints.

a) The probability values of the Gaussian Distribution over X is given by

P(X | , V) =

We need to maximize this to find the values of and **V**. That is done by partially derivating this equation with respect to and **V** separately, setting it to 0and solving for the values

b) Minimizing the log of a function is the same as maximizing the function itself. Take the log of the equation to minimize it.

b) Derivative of log(x) is 1/x

c) Derivative of f(g(x)) is f’(g(x)).g’(x)

d) log (ab) = log a + log b

e) log () = x

f) log ( = b log a

2) Given the following statistics, what is the probability that a man has a particular disease in a town if he has been tested positive from a home testing kit

* One percent of men have the disease
* 90% of men who have the disease test positive on the home kit
* 8% of men who use the kit will have false positives.