Home Assignment – 2

1. Using MATLAB, find the divergence of the two-dimensional vector field $\vec{A} = e^{-(r/\alpha)^2}\vec{r}$, where $\vec{r} = x\hat{a}_x + y\hat{a}_y$.
2. Consider an electric dipole: using MATLAB, plot the equipotential contours and the electric field surrounding the charges.
3. Compare the analytical and numerical evaluation of the area under the curve defined by the function $y = x^2$ in the interval $0 \leq x \leq 4$.
4. Evaluate the potential at the point $z = a$ due to a charge Q being distributed uniformly upon a square surface whose area is equal to a^2 if the number of subareas is equal to one and four. The center of the square is the $z - axis$, which creates significant symmetry in the problem.
5. Plot the coefficient for the electric field as a function of distance z from a square that contains a uniform charge distribution of ρ_s. The $z - axis$ is at the center of the square.
6. Plot the potential in the $x - y$ plane in the region $x > 0$ due to a uniformly charged line that is 10 units long and is located at $y = 0$.