Assignment 2
PHGN361

Homework due Jan. 25

1. Given point P(-2,6,3) and the vector function $\overrightarrow{\mathbf{A}} = y\hat{x} + (x+z)\hat{y}$,
   (a) express P and $\overrightarrow{\mathbf{A}}$ in cylindrical and spherical coordinates and
   (b) evaluate $\overrightarrow{\mathbf{A}}$ and P in the Cartesian, cylindrical and spherical systems.
2. Chapter 1 problems 46, 53.
3. Chapter 2 problems 20, 21, 25, 29, 30, 31, 32.
4. Using Mathematica (Load the graphics package using the command $Needs[\text{“}Graphics`PlotField`\text{”}]$), obtain the following plots for the scalar function
   $\Phi = xyExp[-(x^2 + 0.08y^2)]$;
   (a) Standard three-dimensional plot of Φ over the interval $\{x, 0, 2.5\}$ and $\{y, 0, 2.8\}$
   (b) Contour plots with 20 contours. $PlotPoints \rightarrow 50$.
   (c) Plot the gradient of the scalar field using $PlotGradientField$
   (c) Plot the x-component of the gradient along the line $y = 1$.