Homework 6

1) What is the maximum value of $y(x) = 3x - 2x^4$ and at which value of x does it occur?

2) Find the roots of $\frac{1}{2}x^4 + 7x^3 - x^2 - 3x - 1$.

3) Determine the roots of $15x + \frac{73x^2}{2} - \frac{5x^3}{2} - \frac{75x^4}{2} - \frac{25x^5}{2} + x^6$ by factorization.

4) For constants a, b, and R, determine the points at which the equations, $x^2 + y^2 = R^2$ and $ax + by = 0$ intersect.

5) Use RegionPlot3D to plot a sphere of radius $R = 2$, with a cylindrical hole of radius 1.
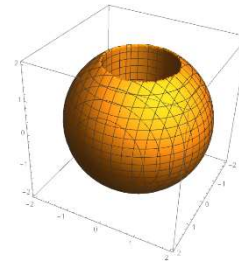
6) Given an initial point $\{r_1, \theta_1, \phi_1\}$ and a final point $\{r_2, \theta_2, \phi_2\}$ in spherical coordinates

   a) Determine the displacement vector between the points in cartesian coordinates

   b) Determine the displacement vector in spherical coordinates (hint: check out the FromSphericalCoordinates and ToSphericalCoordinates functions)