Problem

Use Excel to solve the following two equations for x and y:

$$2x^{1/3} + y^2 = 7.8322$$

$$\ln(x) + y^2/4 = 2.4032$$

Problem

Use Excel to solve the following equation for x using Newton's method. Use an initial guess of x=1.

$$3x^2 e^{-x} = 1$$

Problem

Data for r (1/s) versus T (°C) are given.

- Find values for k and E for the following model using a trend line:

$$r = ke^{-E/(T+273.15)}$$

- Show the plot you use, including the trend line. Use symbols (not lines) for the data. Include x and y axes titles. Increase all font sizes to 14 pt.
- Show the trend line equation and R^2 value on the plot.

Problem

When fluid flows near a wall, a boundary layer develops. The velocity profile, u, is zero at the wall, and transitions to the free-stream velocity far away from the wall. Three rate equations describe the flow:

$$\frac{dk}{dx} = -\frac{1}{2}gk$$

$$\frac{dg}{dx} = u$$

$$\frac{du}{dx} = k$$

Here, x is distance from the wall instead of time. The "initial" (x=0 or wall) values for u and g are 0, that is u_0=0, g_0=0. The initial value for k is unknown, so we will guess it's value to be k_0=0.1, then once we have solved the rate equations, we'll vary k_0 to get a known value of u=1 at x=10.

- Use the Explicit Euler method to solve these coupled rate equations from x=0 to x=10 with dx=0.1, using u_0=0, g_0=0, k_0=0.1.
- Use Excel to get k_0 so that u(10)=1. Report k_0.
- Plot u(x) with a line and label the axes.