Lab 10

1. A rocket is going vertically up and expels fuel at a velocity (u) 2000 m/s at a consumption rate (q) of 2100 kg/s. The initial mass of the rocket (m_0) is 140,000 kg. Applying Newton's second law of motion one can obtain the following equation relating the distance with time.

$$\frac{dx}{dt} = u \ln\left(\frac{m_0}{m_0 - qt}\right) - gt$$

If the rocket starts from rest at $t = 0$ seconds, calculate the vertical distance covered by the rocket from $t = 8$ to $t = 30$ seconds, taking $g = 9.8\ m/s^2$.

2. A company advertises that every roll of toilet paper has at least 250 sheets. The probability that there are 250 or more sheets in the toilet paper is given by

$$P(y \geq 250) = \int_{250}^{\infty} 0.3515\ e^{-0.3881(y-252.2)^2} dy$$

Approximating the above integral as

$$P(y \geq 250) = \int_{250}^{270} 0.3515\ e^{-0.3881(y-252.2)^2} dy$$

by using n segment ($n = 4,8,16$). Assume that the exact value of the above integral is 0.97377, calculate error for each n.

Neither use *trap* nor *quad* functions in your solutions.