Math 246 Homework Assignment Two
Show your work for each problem

Do the following problems showing all your work. Be sure to submit your solutions in PDF format to the Assignment area (Point values are given in the square brackets.)

1. [2] Solve the initial value problem:

$$\frac{dy}{dx} = -7xy, \quad y(0) = 6$$

2. [3] A lunar lander is falling freely towards the surface of the moon at a speed of 450 meters per second (m/sec). Its retrorockets, when fired, provide a constant deceleration of 2.5 meters per second per second (m/sec^2) (where the moon's gravitational acceleration is assumed to be included in this value.) At what height above the lunar surface should the retrorockets be activated to ensure a "soft landing" (that is, v=0 at impact.)

3. [4] Find all solutions of the differential equation:

$$\frac{dy}{dx} = 6x(y-1)^{\frac{2}{3}}$$

4. [4] The half-life of radioactive cobalt is 5.27 years. Suppose that a nuclear accident has left the level of cobalt radiation in a certain region at 100 times the level acceptable for human habitation. How long will it be until the region is again habitable (ignore the presence of any other radioactive isotopes)?

5. [4] Solve the initial value problem: $\quad \frac{dy}{dx} = 4x^3y - y, \quad y(1) = -3$

6. [4] Solve the initial value problem by finding a suitable integrating factor:

$$y' = 1 + x + y + xy, \quad y(0) = 0$$

7. [4] Find the general solution of: $\quad (x^2 + 1)\frac{dy}{dx} + 3xy = 6x$