Math 252 X01
Assignment 2

Covers: Sections 3.1, 4.1-4.4
Due: Mon Feb 23 at 8:30am

INSTRUCTIONS:
This assignment will be marked for completion.
Solutions will be posted on the course website 24 hours after the deadline.
You may not copy the work of another person or AI.
Submit jpg or pdf files to the D2L Dropbox.

1. a) The rate of change of z with respect to t (in units/year) is determined by two processes. One process decreases z by 1.75 units/month. The other process increases z by $0.17z$ units/year. Write down a differential equation relating z and t. Do not solve the DE.

b) A falling object's acceleration is equal to acceleration due to gravity (written g) minus a term proportional to the object's speed to account for air resistance. Write down a differential equation relating the object's speed v and time t. Do not solve the DE.

2. Find a second linearly independent solution to the following DE, given that $y_1 = e^{-2x^2}$ is a solution:

$y'' + 8xy' + (4 + 16x^2)y = 0$

3. Solve:
$y'' + 6y' + 13y = 0, \quad y(\pi) = 3e^{-3\pi}, \quad y'(\pi) = -19e^{-3\pi}$

4. Find y_C and y_P:
a) $y'' + 2y' - 35y = 7\cos 3x - 6\sin 4x$
b) $y''' - 2y'' = 12x - 3\cos 2x$

5. Solve:
$y'' + 12y' + 36y = 11e^{-2x} + 5\cos 3x + 14$