Math 252 X01
Test Three

Time: 50 minutes
Total: 20 marks

Name: _____

1. [2 marks] Solve $2x^2y'' - 2xy' + 3y = 0$.

2. [3 marks] a) Set up the DE and the initial conditions.
Do not solve the DE.

A mass weighing 166.6 N stretches a spring by 83.3 cm. The environment creates a damping force with magnitude 4 times velocity. The mass is initially released from 30 cm below the equilibrium position, heading upwards at 2 m/s.

2. b) [3 marks] Given $x = 4\cos 2t - 3\sin 2t$, find the first time when the mass passes through the equilibrium position.

3. [6 marks] Solve $y'' - 2y' + y = e^x \ln x$,
given that $y_C = C_1 e^x + C_2 x e^x$.

4. [6 marks] Use sigma notation to write C_2, C_3, C_4 and C_5 in terms of C_0 or C_1:
$$y'' - 3xy' = 0.$$