Math 252 X01
Test Two

Time: 50 minutes
Total: 20 marks

Name: _____

1. [5 marks]

a) The rate of change of z with respect to t (in units/year) is determined by two processes. One process decreases z by 100 units/year. The other process increases z by $0.07z$ units/year. Write down the DE but **do not solve the DE**.

b) A large tank with a capacity of 500 L initially contains 130 L of pure water. A 12 g/L sugar solution is pumped in at a rate of 2 L/min. The well-mixed solution is pumped out at a rate of 5 L/min. Let A represent the number of grams of sugar in the tank after t minutes. Write down the DE but **do not solve the DE**.

2. [6 marks] Solve:

a) $y'' + 10y' + 25y = 0$

b) $y'' + 49y = 0$

c) $y'' + y' - y = 0$

3. [4 marks] Find y_2 given that $y_1 = x^{-17/3}$ is a solution:

$21x^2y'' + 197xy' + 323y = 0$

4. [5 marks] Solve $y'' - 6y' + 8y = e^{2x} + 5x$