

Score:

Name: Solutions
Period (circle one): 1 2 3 4 5 6
Team (circle one): a b c d e f

SM286 – Quiz 6 – Section 4.3a
Homogeneous DEs with Constant Coefficients (Real Roots)

1. Solve the following initial value problem:

$$\frac{d^2x}{dt^2} - 4\frac{dx}{dt} + 3x = 0, \quad x(0) = 0, \quad x'(0) = -2$$

$$(D^2 - 4D + 3)X = 0 \Rightarrow (D-3)(D-1)X = 0$$

$$D = 3, 1$$

$$\Rightarrow x = c_1 e^{3t} + c_2 e^t$$

$$x' = 3c_1 e^{3t} + c_2 e^t$$

$$\Rightarrow x(0) = c_1 + c_2 = 0$$

$$x'(0) = 3c_1 + c_2 = -2$$

$$-2c_1 = 2 \Rightarrow c_1 = -1$$

$$c_2 = 1$$

$$\Rightarrow \boxed{x = -e^{3t} + e^t}$$