
MATH 255 – Midterm II

November 15, 2006

Your full name: _____

ID Number: _____

Scores:

Problem 1 _____ (5 points)

Problem 2 _____ (5 points)

Problem 3 _____ (5 points)

Problem 4 _____ (5 points)

TOTAL: _____ (**20 points**)

One 8.5×11 sheet of notes allowed.

Show all your work and make your reasoning clear.

Problem 1 (5 points)

Find the general solution of

$$y' = 2y + (4 - x).$$

Problem 2 (5 points)

Find the general solution of

$$x' = \begin{bmatrix} 1 & 2 \\ 3 & 6 \end{bmatrix} x.$$

Problem 3 (5 points)

Use the Laplace transform to solve

$$y'' - 3y' + 2y = \begin{cases} 0 & 0 \leq t < 3, \\ 1 & 3 \leq t < 6, \\ 0 & t \geq 6, \end{cases} \quad y(0) = 0, \quad y'(0) = 0$$

Problem 4 (5 points)

Consider the 2-by-2 system $x' = Ax$ where the matrix A is skew-symmetric, i.e. $A = -A^\top$. Show that $x_1^2 + x_2^2$ is constant in time. (Hint: Show $\frac{d}{dt}(x_1^2 + x_2^2) = 0$)

