Georgia Tech – Lorraine
Fall 2019
Differential Equations
Math 2552
11/6/2019

EX
1
2
3
TOT

Last Name:
First Name:

Midterm n^0 2 (50 minutes)

Show your work and justify your answers. Calculators, notes, cell phones, books are not allowed. Please do not use red or pink ink. Maximum: 25 points

---

Exercise 1   (a) [**3 points**] Find the general solution of the homogenous linear differential equation

$$y'' - 6y' + 8y = 0 \,.$$

(b) [**5 points**] Find a particular solution of the linear differential equation

$$y'' - 6y' + 8y = 2t + e^{2t} \,.$$

Exercise 1 (continued)

(c) [**4 points**] Solve the initial value problem

$$y'' - 6y' + 8y = 2t + e^{2t}, \qquad y(0) = 0, \ y'(0) = 0.$$

Exercise 2 Let f be the function defined on $[0, +\infty)$ by

$$f(t) = \begin{cases} e^{t/2}, & 0 \le t \le 2 \\ 1 & t > 2 \end{cases}$$

(a) **[2 points]** Sketch the graph of f.

(b) **[2 points]** Show that f is piecewise continuous.

(c) **[2 points]** Show that f is of exponential order (as $t \to +\infty$)

Exercise 2 (continued)

(d) [**4 points**] Using the definition, compute the Laplace transform of f.

(e) [**2 points**] Compute $\lim_{s\to+\infty} \mathcal{L}\{f\}(s)$.
Why should we know this limit without computing it? Justify your answer.

Exercise 3 [**2 points**]

Is the function $f(t) = e^{t(t-1)}$ of exponential order? Justify your answer.