

April 9, 2009

MAE 105 Quiz #1
Total Time: 20 minutes
(Closed Book & Notes; No Calculators or Computers or Cell Phones)

Name: _____

PROBLEM 1

(0.5 Point) Find the *general* solution of the following ODE:

$$\frac{du(x)}{dx} = 5x^4.$$

(0.5 Point) Consider the initial condition

$$u(0) = 3,$$

for the above ODE, and find the final solution that satisfies both the ODE and the initial condition.

PROBLEM 2

(1.25 Point) Solve the following ODE and find its *general* solution:

$$\frac{d^2u(x)}{dx^2} = \sin x.$$

(1.5 Point) Consider the following boundary conditions:

$$u(0) = 2, \quad \frac{du(\pi)}{dx} = 3,$$

for the above ODE, and find the final solution that satisfies both the ODE and the boundary conditions.

PROBLEM 3

(1.25 Point) Solve the following ODE and find its *general* solution:

$$\frac{dG(t)}{dt} - 2G(t) = 0.$$

For an extra 0.5 Point, solve the following ODE, using integration by parts:

$$\frac{du(x)}{dx} = x \sin x, \quad u(0) = 0.$$

Note: Your *general* solutions for all three Problems must include the necessary integration constant(s). Then find these constants when initial or boundary conditions are given.

Note 1: To receive full credit, *all steps must be neatly shown*. Writing down the final results will receive no credit.