

# MATH 3113-005 Sample Test I

Dr. Darren Ong

75 minutes

This is a 75 minute test. Answer the questions in the spaces provided on the question sheets. If you run out of room for an answer, continue on the back of the page. Calculators are not allowed, but you are allowed to answer questions in terms of algebraic functions and exponentials (e.g. “ $((15)^2 e^{3/17} - 1/\sqrt{2})$  seconds” is an acceptable answer to a word problem).

Name: \_\_\_\_\_

Problem	Score
1	
2	
3	
4	
5	
6	
Total	

1. (10 points) Section 1.1 Problem 33

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2. (15 points) Section 1.2 Problem 11

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3. (15 points) Find the general solution for  $\frac{dy}{dx} = \sqrt[3]{xy}$ .

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4. (25 points) Section 1.5 36(a)

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5. (20 points) Section 1.6 Problem 32

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6. (10 points) Consider a differential equation  $y' = f(x)$ , with initial condition  $y(0) = 0$ . Answer **three of the following four questions**.
- a) Construct an  $f(x)$  for which the existence-uniqueness theorem asserts that a unique solution  $y$  exists.
  - b) Construct an  $f(x)$  for which the existence-uniqueness theorem asserts that a solution  $y$  exists, but doesn't assert anything about uniqueness of  $y$ .
  - c) Construct an  $f(x)$  for which the existence-uniqueness theorem asserts that there are at least two different solutions for  $y$ .
  - d) Construct an  $f(x)$  for which the existence-uniqueness theorem doesn't assert anything about existence or uniqueness of  $y$ .

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