

**MATH 2260 (Ordinary Differential Equations I) — Fall 2014**  
**Midterm Exam #1 Review problems**

Section 1.2: #1, 4, 6

Section 1.3: #1, 5, 9

Section 2.1: #3, 4, 9, 18, 20, 32, 40

Section 2.2: #4, 6, 12, 19

Section 2.3: #6, 8, 10

Section 2.4: #4, 10, 11, 16, 26, 28, 48

Section 2.5: #2, 4, 6, 12, 14, 20, 22

Section 2.6: #4, 6, 14, 20

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**Practice Midterm Exam #1**

1. (20 points) Solve  $2x \frac{dy}{dx} + \cos^2(y) \ln(x) = 0$ .
2. (20 points) Solve  $x^2 \frac{dy}{dx} - 3x^2y = x^3$ .
3. (10 points) Show that  $(y - x) \frac{dy}{dx} - 7y = xe^{y/x}$  is a homogeneous nonlinear equation.
4. (20 points) Solve  $\frac{dy}{dx} - \frac{1}{7}y = x/y^6$ .
5. (10 points) Is  $y(x) = xe^{2/x}$  a solution of  $x^3y'' + 2xy' - 2y = 0$ ?
6. (20 points) Consider  $(2x^2 + y)dx + (x^2y - x)dy = 0$ 
  - (a) Show that the equation is not exact.
  - (b) Find an integrating factor to make it exact.
  - (c) Find an implicit definition of the solution  $y(x)$ .