

**Math 21B: Calculus II**  
**Fall 2016, Sections B01-B02**  
**Homework Sheet 4**  
**Due: Tuesday, October 25th, 2016**

Submit your solutions to the following problems at the beginning of your discussion section on Tuesday, October 25th. You should present your work in a clean and organized fashion, either on a printed copy of this document or a separate sheet of paper. As stated in the syllabus, late submissions will **not** be accepted.

1. Evaluate the following integrals.

(a)  $\int x \ln(x) dx$

(b)  $\int x^5 e^{x^2} dx$

(c)  $\int e^{2x} \cos(x) dx$

(d)  $\int \sin^3(x) \cos^4(x) dx$

(e)  $\int \tan^3(x) \sec^3(x) dx$

2. Find the general solution to the following differential equation. Then find the particular solution satisfying  $y(1) = 0$ .

$$\frac{dy}{dx} = \ln(x)\sqrt{y(x)}$$

3. Verify that  $y(x) = \frac{1}{2}(e^x - e^{-x})$  is a solution to the following differential equation. Is this the most general solution possible?

$$\frac{d^2y}{dx^2} - y(x) = 0$$

4. Suppose that the half life of a radioactive element is 1500 years. What percentage of the element remains after 2000 years have passed?