

Study Guide for Final in Math 176

1. Solving exponential and logarithmic equations as in exam 3 study guide.
2. Consider the function $f(x) = x e^x$.
 - (a) Find all critical points of f .
 - (b) Find the intervals where f is increasing/decreasing.
 - (c) Show that $f''(x) = (x+2)e^x$ and then find intervals where f is concave up/down.
 - (d) Find all inflection points of f .
 - (e) Use the information from above to sketch a graph of f . Indicate extrema and inflection points on the graph.

3. Repeat exercise (2) with the function $f(x) = x e^{-x}$ but in (c) show

$$f''(x) = e^{-x}(x - 2).$$

4. Repeat exercise (2) with the function $f(x) = x^2 e^{-x}$. For part (a) show that

$$f'(x) = (2x - x^2)e^{-x}$$

and in (c) show

$$f''(x) = (x^2 - 4x + 2)e^{-x}.$$

Find the zero's of $p(x) = x^2 - 4x + 2$ using the quadratic formula—show work.

5. Repeat exercise (2) with the function $f(x) = x^2 e^x$ but in (c) show

$$f''(x) = (x^2 + 4x + 2)e^x.$$

Using the quadratic formula, show that the zero's of $p(x) = x^2 + 4x + 2$ are $x = -2 - \sqrt{2}$ and $x = -2 + \sqrt{2}$.

6. Determine the following integrals

- (a) $\int \frac{\sqrt{x} + 1}{x} dx$

- (b) $\int x^{2/3}(x + 1) dx$

Note: To study the *examples* recommended below, please be certain that you can solve the example correctly without consulting the solution in the text.

7. **Examples:** (These are the completely solved examples in the text.)

- section 3.2 #4, 5
- section 3.3 #1-5
- section 5.6 #1-3
- section 7.1 #1, 2

8. **Exercises:**

- section 4.4 #15, 17, 23, 25
- section 6.2 #3, 7, 27, 35, 37
- section 6.5 #3, 7, 13, 25
- section 7.1 #1, 13, 15

9. **Office Hours:** I will post updated office hours on my web-page the evening of May 8, Tuesday. The office hours scheduled during the semester are valid through May 8.

10. **Final date and time:** Monday, May 14, 12 Noon-2 PM