

Homework #7: Sections 7.6, 7.8 and 8.1

Complete each question below. Answers should be carefully written up, showing all necessary work for each step to complete each problem. Your turned-in work should be neat and legible. If I cannot understand or follow your work you will not get credit for it. You may discuss these problems with myself, the TAs and Math Center tutors, and your classmates, but once you start writing up the problem to turn in, you must complete the write-up on your own. This assignment is out of **42 points**. It is due at the **start of class on Tuesday, October 13**.

- (7 points) You are choosing your seat in a movie theatre. Your goal is to maximize the apparent size of the screen once you are in your seat. The screen is 20 feet high and it is hung so that its bottom is 5 feet above where your head will be when you sit down. The seating in the theatre is completely horizontal. How many feet back from the screen should you sit to maximize your view?
- (5 points) Find $\lim_{x \rightarrow \infty} (e^x + x)^{\frac{1}{x}}$.
- (10 points) Graph the function $y = xe^{-x^2}$. Show all intercepts, asymptotes, critical points, and inflection points. You may need to use L'Hopital's rule.
- (5 points) Find $\int t^3 e^{-t^2} dt$. Hint: You may need to use more than one integration technique in sequence.

- (8 points) Find

$$\int_{-\frac{\pi}{6}}^{\frac{\pi}{6}} e^{-\theta} \cos(2\theta) d\theta.$$

- (7 points) The region between the curves $y = e^x$, $y = e^{-x}$, and $x = 1$ is rotated about the line $x = -1$. Find the volume of the resulting shape.