Homework 7

Math 252

Due June 2nd at 11:59 PM

Textbook Exercises

3.2: 69, 70, 73, 75, 79, 81, 85, 85, 87, 97

3.3: 127, 134, 137, 138, 139, 141

3.4: 183, 185, 189, 195, 197, 199, 201, 205, 207, 209

3.7: 347, 349, 351, 357, 359, 367, 371

4.1: 9, 11, 19, 29, 37

4.2: 66, 67, 68, 69, 75, 79

4.3: 119, 125, 129, 135

Exercise 1: Evaluate $\int \frac{\sqrt{x^2+9}}{x}\,dx$.

Hint: Once you've substituted and simplified, expand $\tan(\theta) = \frac{\sin(\theta)}{\cos(\theta)}$ and $\sec(\theta) = \frac{1}{\cos(\theta)}$. Then use $\sec^2(\theta) = 1 + \tan^2(\theta)$ and split the integral and use $\int \csc(\theta)\,d\theta = -\ln(\csc(\theta) + \cot(\theta)) + C$.

Exercise 2: A tank contains 1 kg of salt dissolved in 100 liters of water. A salt solution of .1 kg per liter is pumped into the tank at 2 liters per minute, and the well-mixed solution is pumped out of the tank at the same rate. Find $C(t)$, the concentration of salt at time t.

Bonus: Give an example of a differential equation that isn't separable.