PRACTICE EXAM 3 - MATH 112

DATE: Friday, March 18
INSTRUCTOR: George Voutsadakis

Read each problem very carefully before starting to solve it. Each question is worth 3 points. It is necessary to show your work. Correct answers without explanations are worth 0 points.

GOOD LUCK!!

1. After t years, the value of a car that originally cost \$16,000 depreciates so that each year it is worth $\frac{3}{4}$ of its value for the previous year. Find a model for $V(t)$, the value of the car after t years. Sketch a graph of the model and determine the value of the car 4 years after it was purchased.

2. Find the second derivative of $f(x) = (1+2x)e^{4x}$.

3. Study the function $f(x) = \frac{\ln(x-1)}{x-1}$. (Find the domain, the intervals of monotonicity, relative extrema, intervals of concavity, inflection points, and roughly sketch the graph.) In your study, you may find the following numbers useful $e^{3/2} \approx 4.5, \ln 4.5 \approx 1.5$.

4. Find $\frac{dy}{dx}$:
   (a) $y = \log_5(x^2+6x)$
   (b) $y = 3x \cdot 7^{-2x}$
   (c) $4xy + \ln(x^3 y) = 7$

5. Compute the following indefinite integrals:
   (a) $\int (\sqrt[4]{x^3}+1)dx$
   (b) $\int \frac{2x^3+1}{x^3}dx$

6. Find the general solution of the differential equation $\frac{dy}{dx} = \frac{2-x}{x^3}, x > 0$, and then the particular solution that satisfies the initial condition $y(2) = \frac{3}{4}$.