

HOMEWORK 6 - MATH 112

DUE DATE: Monday, March 19

INSTRUCTOR: George Voutsadakis

Read each problem **very carefully** before starting to solve it. Four out of the eight problems will be chosen at random and graded. Each problem graded is worth 3 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points.

GOOD LUCK!!

1. Sketch the graph of the function $f(x) = 3^x$. Then use transformations to obtain the graph of the function $g(x) = -3^x + 5$.
2. Solve the following exponential equations:
 - (a) $(\frac{1}{3})^{3x+1} = 27$
 - (b) $4^2 = (x+2)^2$
 - (c) $5^{x^2} = 25^{3x} \cdot 5^7$
3. After t years, the value of a car that originally cost \$16,000 depreciates so that each year it is worth $3/4$ of its value for the previous year. Find a model for $V(t)$, the value of the car after t years. What is the value of the car 6 years after it was purchased?
4. How much should be deposited now in an account paying interest rate 4% compounded every two months so as to have 10,000 in the account in 5 years time?
5. Find the effective rate of interest corresponding to a nominal rate of 9% compounded (a) quarterly and (b) continuously.
6. Find the derivatives of the following functions
 - (a) $f(x) = e^{1-x^2}$
 - (b) $g(x) = (4x^2 - 7x^2 + 1)e^{7x}$
 - (c) $h(x) = \frac{(e^x + e^{-x})^4}{2}$
7. Determine the equation of the tangent line to the graph of
 - (a) $f(x) = xe^{-2x}$ at $(1, \frac{1}{e^2})$
 - (b) $e^{xy} + x^2 - y^2 = 10$ at $(3, 0)$.
8. Find the domain, the intercepts, the relative extrema, the intervals of monotonicity, the inflection points and the intervals of concavity and then sketch the graph of the exponential function $f(x) = x^2e^{-x}$.