

HOMEWORK 5 - MATH 112

DUE DATE: Monday, March 8

INSTRUCTOR: George Voutsadakis

Read each problem very carefully before starting to solve it. One part of each problem will be chosen at random and graded. Each question is worth 1 point. It is necessary to show your work. Correct answers without explanations are worth 0 points.

GOOD LUCK!!

- Find the price per unit p that produces the maximum profit P given the cost function $C = 100 + 30x$ and the demand function $p = 90 - x$.
- Use the cost function $C = 2x^2 + 5x + 18$ to find the production level for which the average cost is a minimum. For this production level, show that the marginal cost and average cost are equal.
- Find the following limits
 - $\lim_{x \rightarrow -2^-} \frac{1}{(x+2)^2}$
 - $\lim_{x \rightarrow 3^+} \frac{x-4}{x-3}$
 - $\lim_{x \rightarrow 0^-} (1 + \frac{1}{x})$
 - $\lim_{x \rightarrow -\infty} \frac{5x^2}{x+3}$
 - $\lim_{x \rightarrow +\infty} (2x - x^{-2})$
 - $\lim_{x \rightarrow -\infty} (\frac{2x}{x-1} + \frac{3x}{x+1})$
- Find the domains, the intercepts, the extrema and the asymptotes and then sketch the graphs of the following functions.
 - $f(x) = \frac{2+x}{1-x}$
 - $f(x) = \frac{x^2}{x^2-16}$
 - $f(x) = \frac{1}{x^2-x-2}$
 - $f(x) = \frac{x^2-x-2}{x-2}$
- Do a detailed study (domain, intercepts, asymptotes, monotonicity, concavity) and graph the following functions
 - $f(x) = x^3 - 4x^2 + 6$
 - $f(x) = x^4 - 4x^3 + 16x$
 - $f(x) = \frac{2x}{x^2-1}$
- Solve the following equations for x
 - $(\frac{1}{3})^{x-1} = 27$
 - $(\frac{1}{5})^{2x} = 625$
 - $x^{\frac{3}{4}} = 8$
 - $(x+3)^{\frac{4}{3}} = 16$

7. Sketch the graphs of the following functions using the values at the points $x = -1, 0, 1$ and your knowledge of the “shape” of exponentials.

(a) $f(x) = 6^x$

(b) $f(x) = 3^{-|x|}$

(c) $f(x) = 2^{-x} + 3$

8. Find the future value of an \$8000 investment if the interest rate is 4.5% compounded monthly for 2 years.