

HOMEWORK 5 - MATH 112

DUE DATE: Monday, March 12

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. Given the cost function $C = 100 + 30x$ and the demand function $p = 90 - x$, find the price per unit p that produces the maximum profit P .
2. An offshore oil well is 1 mile off the coast. The oil refinery is 2 miles down the coast. (See the figure on page 218 of your book.) Laying pipe in the ocean is twice as expensive as laying it on land. Find the most economical path for the pipe from the well to the oil refinery.
3. Find the limits $\lim_{x \rightarrow 1^+} \frac{2+x}{1-x}$ and $\lim_{x \rightarrow 0^-} (x^2 - \frac{1}{x})$.
4. Find the limits $\lim_{x \rightarrow \infty} \frac{5x^3+1}{1-x^3-3x^2+7}$ and $\lim_{x \rightarrow \infty} \frac{2x^{10}-1}{10x^{11}-3}$.
5. Find the domain, the intercepts, the extrema and the asymptotes and sketch the graph of $f(x) = \frac{2x}{1-x^2}$.
6. Analyze (intercepts, monotonicity, maxima, concavity, inflection points) and sketch the graph of $f(x) = -x^3 + 3x^2 + 9x - 27$.
7. Analyze (intercepts, monotonicity, maxima, concavity, inflection points) and sketch the graph of the function $f(x) = x^4 - 4x^3 + 5$.
8. Analyze (domain, intercepts, asymptotes, monotonicity, maxima, concavity, inflection points) and sketch the graph of $f(x) = \frac{x^2+1}{x^2-1}$.