Math 241: HW 12

Due on Friday, October 18

Fall '13

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Problem 1

For the following functions give the critical points, intervals of increase/decrease, intervals of concavity, any local min/max, equations of any asymptotes (horizontal, vertical, oblique). Finally give a sketch of the given function.

$$f(x) = x^2 - 4x + 3$$
$$g(x) = -2x^3 + 6x^2 - 3$$
$$h(x) = \frac{x^3}{x^2 + 1}$$
$$k(x) = \frac{x^2 - 3}{x - 2}$$

Problem 2

Suppose that you are to produce a can (a right cylinder with circular base) with a volume of $1000cm^3$. What are the dimensions the minimize the amount of material needed to construct said can? Hint: For any cylinder, the volume is the base area, B_A, times the height, so that $V = \pi r^2 h$. The surface area of such a cylinder is 2 circles of radius r plus a rectangle of height h and length $2\pi r$ (why?). Now minimize the surface area using your constraint equation (volume) to write the surface area as a function of one variable.

Problem 3

Determine the point on the graph of $y = \sqrt{x}$ that is closest to the point $(3, 0)$.