MATH 140: Week-In-Review 8 (5.2)

Problem 1 *Which of the following are polynomials?*
For each polynomial, give its degree, leading coefficient, and constant term.

(a) $f(x) = 5 + 2x^3 - 4x^5 + 21x^2$

(b) $g(x) = \sqrt{3}x^2 + 7$

(c) $h(x) = x^{3/5} + 2x + 1$

(d) $k(x) = 8x^4 - 9x^{-2} + x$

(e) $m(x) = \pi + 5x^3 + x^8$

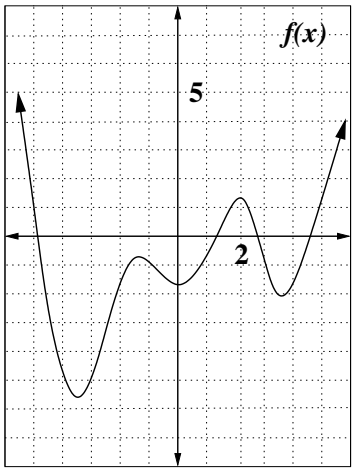
Problem 2 *Determine the end behavior of the following polynomials.*

(a) $f(x) = ax^{10} + bx^3 - cx + d$ *where* $a < 0, b > 0, c > 0,$ *and* $d < 0$

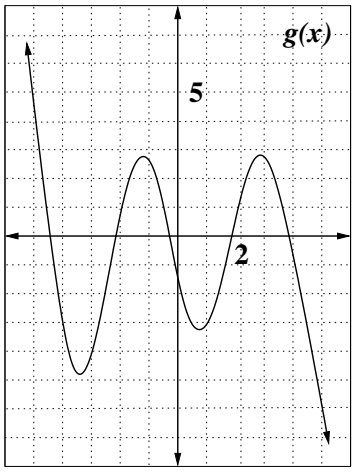
(b) $f(x) = ax^3 - bx^5 + c$ *where* $a < 0, b < 0,$ *and* $c > 0$

Problem 3 *For each of the following graphed polynomials, determine whether it is an even or odd degree polynomial and whether the leading coefficient is positive or negative.*

(a)



(b)



Problem 4 *For each of the following quadratic functions, determine*

(i) The direction the graph opens

(ii) The vertex (Is it a MAX or a MIN?)

(iii) The location of all zeros

(iv) All intercepts

(v) The axis of symmetry

(vi) The domain

(vii) The range

(a) $f(x) = -3x^2 + 15x + 42$

(b) $g(x) = 2x^2 - 10x - 72$

(c) $h(x) = (x+3)^2 + 14$

Problem 5 *Algebraically solve the following EXACTLY for x.*

(a) $2x^2 - 7x = 4$

(b) $3x^2 + 7x = 11$

Problem 6 *Determine the location of all real zeros of the function,*

$$f(x) = -9x^3(x+8)^2(x-4)(2x+7)^5(3x-5)^8$$

Problem 7 *The price-demand function, $p = -25x + 1500$, gives the price (in dollars) consumers demand when wanting to buy x gadgets.*

(a) Write the revenue function for the company selling these gadgets.

(b) What is the maximum revenue the company can expect to bring in?

(c) At what price will the gadgets be sold in order to maximize revenue?

Problem 8 *For a particular item consumers will buy 150 of these items at a price of \$8. For each 10 cent drop in price, consumers will buy an additional 5 items.*

(a) Determine the price of the item, p, as a function of the number of these items consumers are willing to buy, x.

(b) If the demand function determines the price of the item, write the revenue function for the sale of this item.

(c) How should this item be priced in order to maximize revenue?

(d) If the company making the item has fixed costs of \$1000 and it costs \$2 to produce each item, what is the cost function for the production of the item?

(e) What is the maximum profit that can be made from the sale of this item?

(f) How should this item be priced in order to maximize profit?

(g) Will this company ever "truly" break even? If so, how many items must the company make and sell in order to do so?