## 29 August 2014 Functions and Mathematical Models

- (1) Determine whether the following functions are odd, even, or neither.
  - (a)  $f(x) = \frac{x}{x^2 + 1}$ (b)  $f(x) = \frac{x}{x + 1}$ (c) f(x) = x|x|(d)  $g(x) = \begin{cases} x^2 & \text{if } x \ge 0\\ -x^2 & \text{if } x < 0 \end{cases}$
  - (e)  $f(x) \cdot g(x)$ , given that f is odd and g is even.
- (2) Suppose g is an odd function and let  $h = f \circ g$ . Is h always an odd function? What if f is odd? What if f is even?
- (3) A rectangular field is to be enclosed with 240m of fence.
  - (a) Draw a diagram to illustrate, and find a mathematical model expressing the area of the field as a function of its length.

- (b) What is the domain of your function?
- (c) Tell me your function and domain, and I will compute the area of the largest field that can be enclosed with 240m of fence.

- (4) A page of print is to contain 24in<sup>2</sup> of printed region, a margin of 1.5in at the top and bottom, and a margin of 1in at the sides.
  - (a) Draw a diagram to illustrate, and find a mathematical model expressing the total area of the page as a function of the width of the printed region.

- (b) What is the domain of your function?
- (c) Tell me your function and domain, and I will compute the dimensions of the smallest page that satisfies these requirements.
- (5) A manager of a 100-unit apartment complex knows from experience that all units will be occupied if the rent is \$800 per month. A market survey suggests that, on average, one additional unit will remain vacant for each \$10 increase in rent.
  - (a) Find a mathematical model expressing the manager's total revenue per month in terms of the amount he charges for rent.

- (b) What is the domain of your function?
- (c) Tell me your function and domain, and I will compute what the manager should charge for rent to maximize his revenue.