## 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) $g(x)= \begin{cases}x^{2} & \text { if } x \geq 0 \\ -x^{2} & \text { if } x<0\end{cases}$
(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 240 m 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 240 m of fence.
(4) A page of print is to contain $24 \mathrm{in}^{2}$ of printed region, a margin of 1.5 in at the top and bottom, and a margin of 1 in 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.

