Name:_____

MATH 150: QUIZ 5 (2.3–2.4)

1. If a function f is *odd*, then $f(-x) =$ $\square$, and its graph is symmetric about $\square$.
2. Find the average rate of change of $f(x) = -x^3 + 3x^2$ from -1 to 4.

3. Compute $f(-1)$, $f(1)$, and $f(10)$, where f is the function

$$f(x) = \begin{cases} x^3 & \text{if } x < 1, \\ |x| & \text{if } x \geq 1. \end{cases}$$

4. The credit card company charges 1.5% per month for the on the first \$1,000 owed and 1% per month on any unpaid amount over \$1,000. Find the function g that gives the amount of interest charged per month on a balance of x dollars.

$$g(x) = \begin{cases} \square & \text{if } \square, \\ \square & \text{if } \square. \end{cases}$$

5. If $f(c)$ is less than or equal to $f(x)$ for all x "near" c, then $f(c)$ is called a $\square$.

Solutions

1. If a function f is *odd*, then $f(-x) = -f(x)$, and its graph is symmetric about *the origin*.
2. Recall that the average rate of change of f from a to b is given by
$$\frac{\Delta y}{\Delta x} = \frac{f(b) - f(a)}{b - a}.$$
We compute
$$\begin{aligned}\frac{\Delta y}{\Delta x} &= \frac{f(4) - f(-1)}{4 - (-1)} \\ &= \frac{-16 - 4}{4 - (-1)} \\ &= \frac{-20}{5} \\ &= -4.\end{aligned}$$
3. Recall that for piece-wise function, the "if switch" tells us which path to travel on. In this case, if $x < 1$, we use the function x^3, and if $x \geq 1$, we use the function $|x|$. We compute
   (a) $f(-1) = (-1)^3 = -1$
   (b) $f(1) = |1| = 1$
   (c) $f(10) = |10| = 10$
4. If x is less than \$1,000, then the interest is $0.015x$ since it is 1.5% on the first \$1,000 dollars. If x is greater than \$1,000, then we must pay the 1.5% on the first \$1,000 plus 1% on the remaining. That means we pay
$$0.015(1000) + 0.01(x - 1000) = 15 + 0.01x - 10 = 0.01x + 5.$$
That gives us that g is
$$g(x) = \begin{cases} 0.015x & \text{if } 0 \leq x \leq 1000, \\ 0.01x + 5 & \text{if } x > 1000. \end{cases}$$
5. If $f(c)$ is less than or equal to $f(x)$ for all x "near" c, then $f(c)$ is called a *local minimum*.