MATH 112 QUIZ 6 MARCH 11, 2009

NAME:

Problem 1 (3 points):
Find and simplify the indicated difference quotient for the function $f(x) = 2x^2$

$$\frac{f(x+h) - f(x)}{h}$$

Solution: We have that $f(x) = 2x^2$ and $f(x+h) = 2(x+h)^2 = 2(x^2 + 2hx + h^2) = 2x^2 + 4hx + 2h^2$.
Therefore, the difference quotient is

$$\begin{aligned} \frac{f(x+h) - f(x)}{h} &= \frac{2x^2 + 4hx + 2h^2 - 2x^2}{h} \\ &= \frac{4hx + 2h^2}{h} \\ &= 4x + 2h \end{aligned}$$

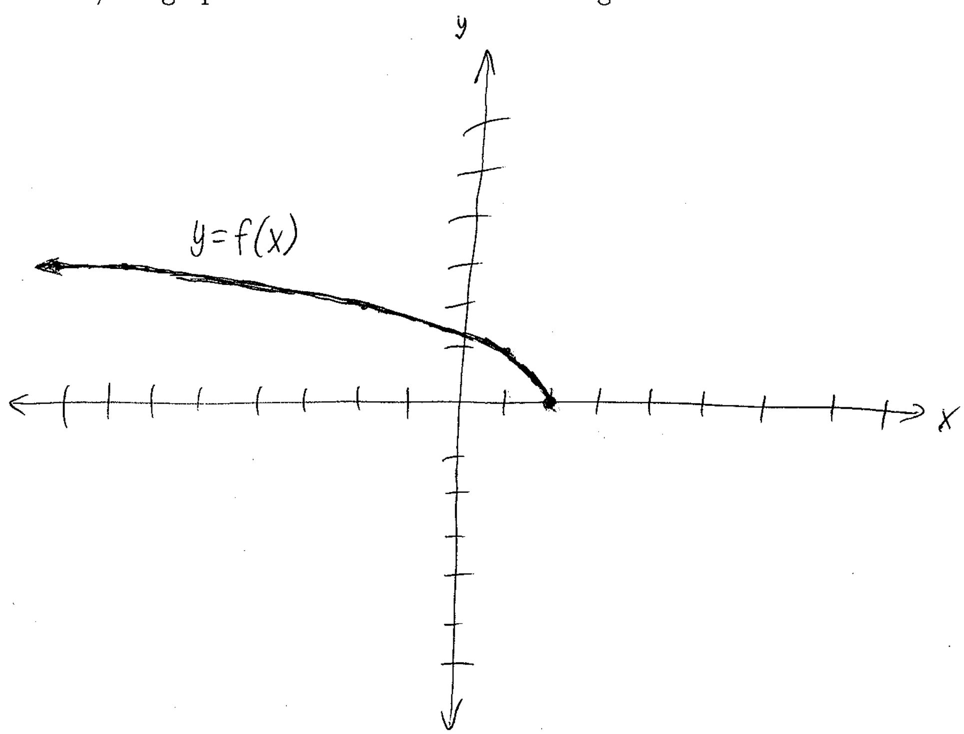
Problem 2 (3 points): *Let* $f(x) = x^2 - 4$ *and* $g(x) = x - 1$. *Find* $(f \circ g)(x)$

Solution:

$$\begin{aligned} (f \circ g)(x) &= f[g(x)] \\ &= f(x-1) \\ &= (x-1)^2 - 4 \end{aligned}$$

Problem 3 (3 points): *Sketch the graph of the function* $y = f(x) = \sqrt{-x+2}$

Solution: We reason as follows.
The graph of $\sqrt{-x}$ is the graph of $\sqrt{x}$ reflected over the y axis. Shifting right by 2 gives us $\sqrt{-(x-2)} = \sqrt{-x+2}$. So the graph of $f(x)$ is the graph of $\sqrt{x}$, first relected over the axis and then shifted right by 2.
Or we can reason as follows. The graph of $\sqrt{x+2}$ is the graph of $\sqrt{x}$ shifted left by 2. Reflecting this over the y axis then gives us $\sqrt{-x+2}$. So we can also treat this as the graph of $\sqrt{x}$ first shifted left by 2 and *then* reflected over the y axis. (Note that this will gives us the same final result as above, even though the operations performed are different).
In either case, the graph should resemble the following.



Problem 4 (1 point): *Saying that* $\frac{2x-2a}{x^2-a^2}$ *is equal to* $\frac{2}{x+a}$ *is (circle one):*

CORRECT *A VITAL ERROR*

Solution: The above operation is **CORRECT**. We can get this result by the following simplifications.

$$\begin{aligned}\frac{2x-2a}{x^2-a^2} &= \frac{2(x-a)}{(x-a)(x+a)} \\ &= \frac{2}{x+a}\end{aligned}$$