MATH 200 (Bueler) Spring 2008

Quiz # 1: SOLUTIONS

1. NEITHER.

2.

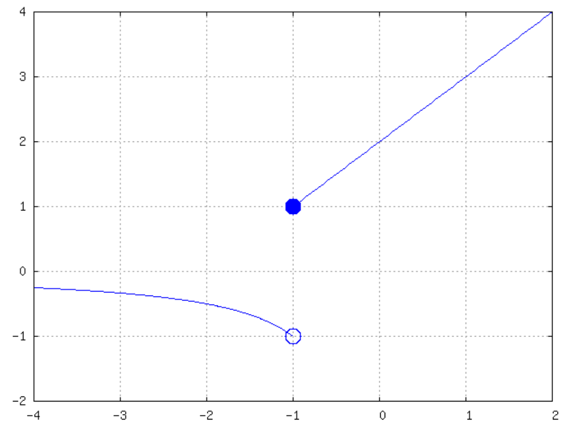

FIGURE 1. The domain of this function is *all real numbers*, or $(-\infty,\infty)$.

3. The new functions are

$$(f\circ g)(x) = f(g(x)) = e^{\sqrt{x}}$$

and

$$(g\circ f)(x) = g(f(x)) = \sqrt{e^x}.$$

The domain of $f\circ g$ is $x \ge 0$. The domain of $g\circ f$ is *all real numbers*.

4. The function $\log_2 x$ is *defined* to be the inverse of the function 2^x. By definition, the inverse of a function undoes the function: $f(f^{-1}(x)) = x$. Therefore $2^{\log_2 x} = x$.

5. (a) BIGGER. (Note $e > 2.5$ so $e^2 > 6.25$.)
(b) POSITIVE.

6. First simplify:

$$g(x) = \frac{f(2+x)-f(2)}{x} = \frac{3(2+x)-3(2)}{x} = \frac{6+3x-6}{x} = \frac{3x}{x} = 3.$$

Therefore the graph of $g(x)$ looks like the figure. Note that the simplification is correct for every x not equal to zero. Note $x = 0$ *is not in the domain of* $g(x)$; I wasn't picky on grading this point, but we will be aware of it.

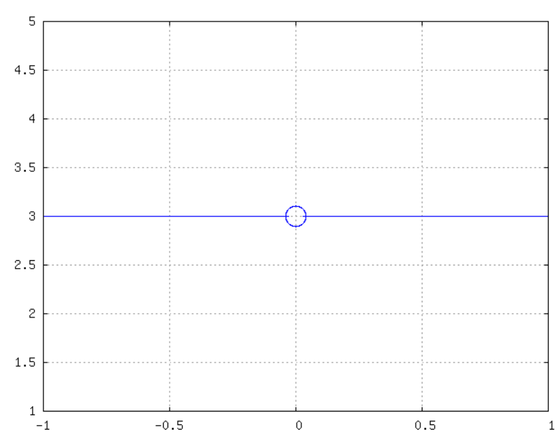

FIGURE 2. $y = g(x) = [f(2+x)-f(2)]/x$ is almost the same as $y = 3$.