Quiz 5
Math 111

Name: Key

Show *all* your work algebraically for each and simplify. No credit is given without supporting work.

1. [4] Use algebra to find the inverse of the given one-to-one function.

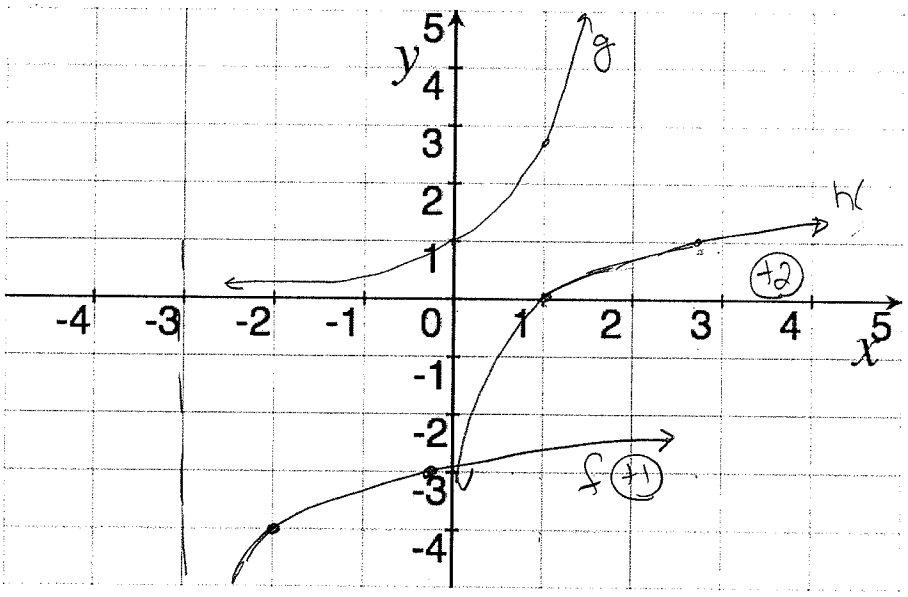
$$f(x) = \frac{1}{2x+1}$$

(+2) $\frac{1}{2g(x)+1} = x$

$1 = 2xg(x) + x$ solving for $g(x)$...

$\frac{1-x}{2x} = g(x)$ (+1)

2. [6] List the transformations needed to transfrm the graph of $h(x) = \ln x$ into the graph of $f(x) = \ln(x+3) - 4$. Graph both h and f. Be sure to identify which one is which. Recall that e is approximately 2.718.



$e^x = g(x)$

vert shift down by 4 units
horiz shift left by 3 units

(+3)

3. Define $f(x) = 1/x$ and $g(x) = x^2 + 2x - 5$.

(a) [2] Find the rule of the function $f - g$.

$\frac{1}{x} - (x^2 + 2x - 5)$ paran (+1) sub (+1)

(b) [2] Find the domain of the function $f - g$.

Domain of f: $(-\infty, 0) \cup (0, \infty)$ } partial +1
Domain of g: $\mathbb{R}$
$\Rightarrow$ Domain of f-g are all x so that $x \neq 0$

4. Define $f(x) = \frac{1}{2x+1}$ and $g(x) = x^2 - 1$

(a) [2] Find the rule of the function $f \circ g$.

$(f \circ g)(x) = f(g(x)) = f(x^2-1) = \frac{1}{2(x^2-1)+1} = \frac{1}{2x^2-1}$
(+1) (+1)

(b) [2] Find the domain of the function $f \circ g$.

all x so that $2(x^2-1)+1 \neq 0$ +1
$\Rightarrow 2x^2 - 2 + 1 \neq 0$
$\Rightarrow 2x^2 - 1 \neq 0$
$\Rightarrow 2x^2 \neq 1$
$\Rightarrow x^2 \neq \frac{1}{2}$
$\Rightarrow x \neq \pm\sqrt{\frac{1}{2}} = \pm\frac{1}{\sqrt{2}}$ +1

5. [2] Compute the following:

(a) $\log_2 16 = ?$

$2^? = 16 = 2 \cdot 2^3 = 2^4$ so $? = 4$

(b) $\log 10,000$

$\log 10{,}000 = \log 10^4 = 4$