Name:_____

No Work ⇔ No Points

Use Pencil Only ⇔ Be Neat & Organized

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1. **Given** $f(x) = \dfrac{3}{5}x + 6$ **and** $g(x) = \dfrac{5}{3}x - 10$, **find**

   (a) **(3 points)** $(f \circ g)(x)$

   (a) _____

   (b) **(3 points)** $(g \circ f)(x)$

   (b) _____

   (c) **(1 point)** **What do you conclude about these two functions?**

   (c) _____

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2. **(3 points)** Find the inverse of $f(x) = \sqrt[5]{x - 2}$.

   2. _____

3. **(3 points)** Find the inverse of $f(x) = x^5 + 2$.

   3. _____

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4. Given $f(x) = \dfrac{4}{x-2}$ **and** $g(x) = \dfrac{2x+4}{x}$, **find**

(a) **(3 points)** $(f \circ g)(x)$

(a) _____

(b) **(3 points)** $(g \circ f)(x)$

(b) _____

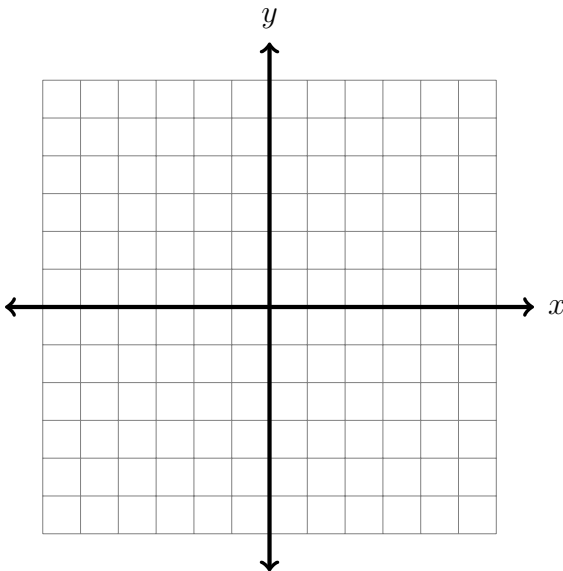(c) **(1 point)** What do you conclude about these two functions?

(c) _____

5. (3 points) Expand: $\log_3 81x^2$

5. _____

6. (3 points) Expand: $\log_2 \dfrac{32\sqrt{x}}{y^3}$

6. _____

7. (4 points) Graph the function $f(x) = 3^x + 2$, **its inverse** $f^{-1}(x)$, **and then complete the chart below.**

	Domain	Range
$f(x)$		
$f^{-1}(x)$		

8. (4 points) Find the inverse of $f(x) = \sqrt[4]{-x - 2}$, **and then complete the chart below.**

8. _____

	Domain	Range
$f(x)$		
$f^{-1}(x)$		

9. (3 points) Write as a single log: $3\log_5 2 + 5\log_5 x - \dfrac{1}{5}\log_5 y$

9. _____

10. (4 points) Graph the function $f(x) = \left(\dfrac{1}{4}\right)^x - 2$, **its inverse** $f^{-1}(x)$, **and then complete the chart below.**
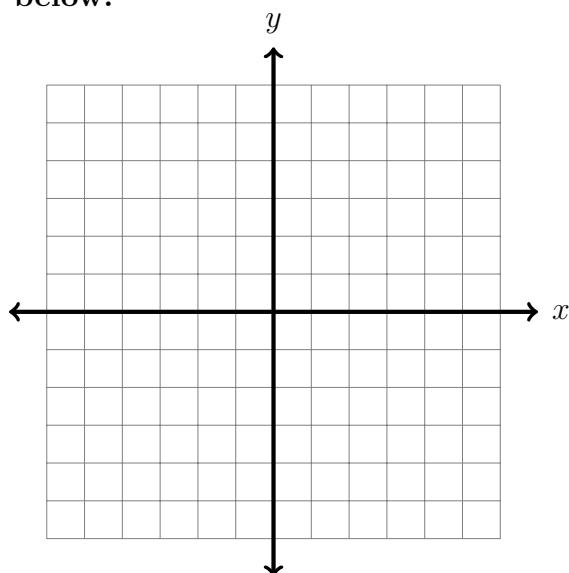
	Domain	Range
$f(x)$		
$f^{-1}(x)$		

11. (3 points) Write as a single log: $2 - 3\log_2 x - \dfrac{3}{4}\log_2 y$

11. _____

12. Consider $2 + 4 + 6 + \cdots + 2^n = 2^{n+1} - 2$,

    (a) **(1 point)** Show that it works for $n = 1$.

(a) _____

    (b) **(5 points)** Use mathematical induction to prove the statement is true for all natural numbers n.