NAME:

1. [10] TRUE/FALSE: Circle T in each of the following cases if the statement is *always* true. Otherwise, circle F.

   Let f and g be functions.

   T   F $f(x + y) = f(x) + f(y)$

   T   F $(f - g)(x) = f(x) - g(x)$

   T   F $f(g(x)) = g(f(x))$

   T   F $(fg)(x) = (gf)(x)$

   T   F $f(\frac{x}{y}) = \frac{f(x)}{f(y)}$

   T   F $\log(\log(10)) = 0$.

   T   F $\frac{\log v}{\log w} = \log v - \log w$ for $v, w > 0$

   T   F   A function is 1-1 if and only if any vertical line passes through the graph of f at most once.

   T   F   If $g(x) = 6|x - 5.24| + \log_{2.7} 8$, then $g(x)$ has an inverse function.

   T   F   The function f with the rule $f(x) = -2^{-x}$ is increasing.

FILL-IN-THE-BLANK: Write the most appropriate answer in the space given. Correct answers will *not* get credit without supporting work.

2. [2] Given $f(2) = 6$ and $g(x) = 3x - 7$, $f(g(3))$ is _____.

3. [3] Let f be defined by $f(x) = \dfrac{6x - 1}{1 - 3x}$. Assuming the inverse of f exists, it is: _____.

4. [2] If $f(2) = 6$ and the graph of g looks like the graph of f stretched vertically by a factor of 2 and shifted down 1, then $g(2)$ is _____.

5. [1] If f and g are inverses and the range of f is $(-\infty, 67]$, then the domain of g is: _____.

LONG ANSWERS: Show all your work and circle you final answer. Correct answers will *not* get credit without supporting work.

6. [1] Given $-x = \frac{2xy}{2y-1}$, solve for y.

7. [2] Define the rule of the function log.

8. [4] Assume b, $x,y > 0$, simplify the following:

$$\frac{(b^x)^{x-1}}{b^{-x}}$$

$$\frac{\sqrt[3]{x^2}(y^2)^{\frac{3}{2}}}{x^{\frac{2}{3}}y^2}$$

9. Write the given expression as a single logarithm.
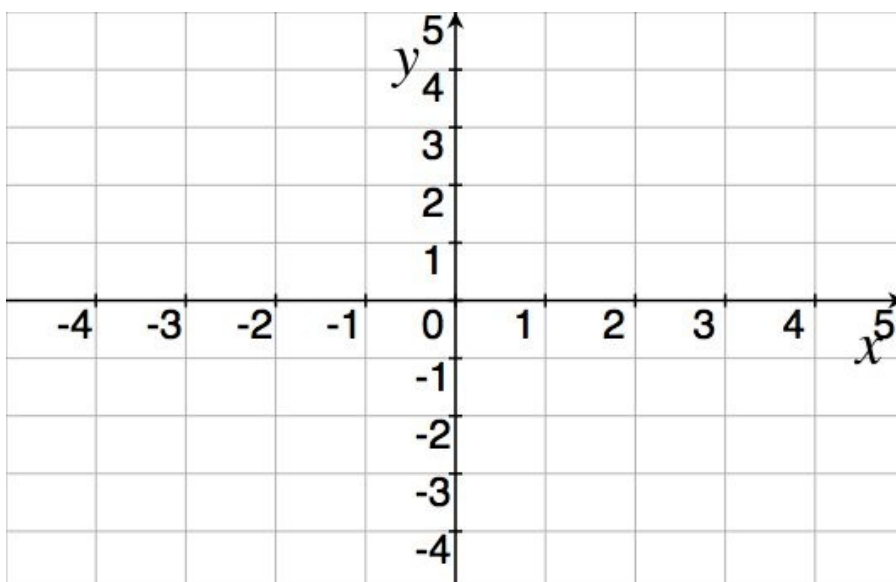
$$2\ln 2x - 3(\ln x^2 + \ln x)$$

$$3 - \log_6(36y)$$

10. [3] Find x in the following:

$$2^{4x-1} = 3^{1-x})$$

$$5^x = 2$$

11. [4] List the transformations needed to transform the graph of $h(x) = \log_2 x$ to the graph of $f(x) = \frac{1}{2}\log_2(x+3) + 1$. Then graph f and its *inverse*.

12. Let $f(x) = 3x + 1$ and $g(x) = \sqrt{x-1}$. Find the following, and specify the domain of each one.

- [2] $(f - g)(x)$

- [2] $(fg)(x)$

- [3] $\frac{g}{f}(x)$

- [1] $g(f(x))$

- [3] $f(g(x))$

13. [] Anne has $20,000 in student loans at the end of her college education with 8% interest compounded quarterly. Anne chooses not to make payments after graduation since she has trouble

    (a) How much money will Anne owe after 2 years?

    (b) How long will it take for Anne's loan to double?