Math 1513 - College Algebra
Final Exam

Name: _____

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1. Complete the following logarithmic and exponential identities:

$$\log_a(x) - \log_a(y) =$$

$$\log_a(x) + \log_a(y) =$$

$$y \log_a(x) =$$

$$\log_a(1) =$$

$$\frac{a^x}{a^y} =$$

$$a^x a^y =$$

$$(a^x)^y =$$

$$a^0 =$$

2. Simplify the following expressions:

a) $\log_3\left(\frac{1}{27}\right)$

b) $\log_{\frac{1}{2}}(8)$

c) $\sqrt[5]{-32}$

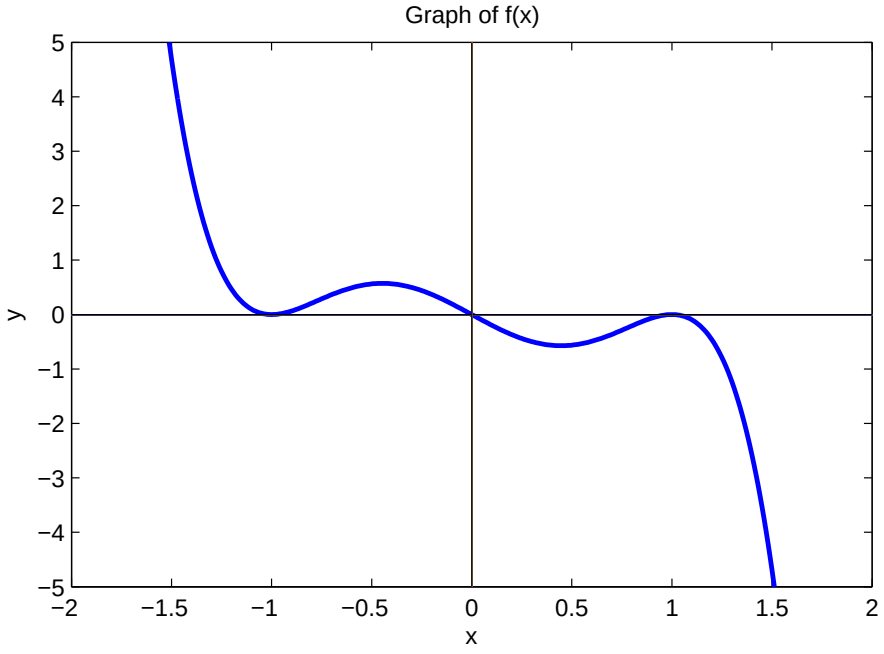
d) $\sqrt[4]{(-2)^8}$

3. Given $x = 1 - 2i$ and $y = 4 + 3i$, compute $x + y$, $x - y$, $x \cdot y$ and $\frac{x}{y}$ and write your answer in the standard form $a + bi$ for a complex number.

4. Find an equation of the line passing through the points $(2, 3)$ and $(6, 1)$.

5. Find an equation of the line with slope 2 passing through the point $(-1, 1)$.

6. Consider the graph of $f(x)$ given below:



Draw, on separate graphs, the following four functions based on the one given above.

a) $f(x) + 2$ b) $f(x + 2)$ c) $|f(x)|$ d) $f(-x)$

7. If $f(x) = 2x^2 + 1$ and $g(x) = \frac{1}{x-1}$, compute the following:

a) $f \circ g(x)$

b) $g \circ f(x)$

c) $f \circ g(2)$

d) $g \circ f(-1)$

8. Factor the following polynomial into linear terms: $x^5 - 7x^4 + 18x^3 - 22x^2 + 12x$

9. Factor the following polynomial into linear terms: $x^5 - 2x^3 + x$

10. Solve the following equations for the unknown variables.

a) $\sqrt{2}^{x+4} = 4^x$

b) $-\frac{3}{4}\log_3\left(16x^4\right) - \frac{2}{3}\log_3\left(8x^3\right) = 7$

11. Solve the following equations for the unknown variables.

a) $\ln(2x + 5) + \ln(x) = \ln(7)$

b) $3^{2x-5} = 61$

c) $-3x^2 + 7x - 8 = 0$

12. Graph the following function:

$$f(x) = x^5 - 3x^4 - 13x^3 + 15x^2$$

13. Graph the following function:

$$g(x) = \frac{3x^2 - 3x - 6}{x^2 + 8x + 16}$$

14. State the domains of the following functions.

a) $f(x) = \frac{x^2+1}{x^3+2x^2+x}$

b) $g(x) = \sqrt{1-x}$

c) $h(x) = \sqrt[3]{1-x^2}$

d) $i(x) = 2^{3x-5}$

e) $j(x) = \log_3(4x+1)$