Name: _____

Place your answers in the spaces provided. <u>You must show correct work to receive credit.</u>

(8 pts) 1. Find the equation of a line that passes through the point $(-2,5)$ and is perpendicular to the line $y = \frac{1}{3}x - 5$. Leave your answer in the form $Ax + By + C = 0$ where A, B, and C are integers.

$$\boxed{}$$

(8 pts) 2. If W varies jointly as x and y^2 and inversely as t, find an explicit formula for W if $W = 18$ when $x = 2$, $y = 3$, and $t = 5$.

$$\boxed{}$$

$W =$

(8 pts) 3. Solve the following equation for x.

$$\log_3(6x) - \log_3(4x - 1) = 2$$

1

$$\boxed{}$$

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$x =$

Place your answers in the spaces provided. <u>You must show correct work to receive credit.</u>

(14 pts) 4. Given the functions $f(x) = x^2 - 3$ and $g(x) = x + 2$, find and simplify each of the
following:

(4 pts) (a) $\dfrac{3}{g(5)}$

(4 pts) (b) $(f - g)(-4)$

(6 pts) (c) $(f \circ g)(x)$

(10 pts) 5. Given the function $f(x) = \dfrac{3}{x+1}$, find the inverse function, $f^{-1}(x)$.

$f^{-1}(x) =$

(8 pts) 6. Given that $\log_2 a = 6$, $\log_2 b = -3$, and $\log_2 c = 7$, find $\log_2 \dfrac{ab^3}{c}$. **Do not use a**

calculator. (Hint: Use the properties of logarithms.)

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Place your answers in the spaces provided. <u>You must show correct work to receive credit.</u>

(14 pts) 7. Simplify each of the following completely. Assume all variables represent positive
numbers.

(6 pts) (a) $\sqrt{50a^{12}b^9}$

(8 pts) (b) $x^{\frac{1}{3}}y^{\frac{5}{2}} \quad \left(x^{\frac{2}{3}}y^{-4}\right)^6$ (Leave your answer with rational exponents.)
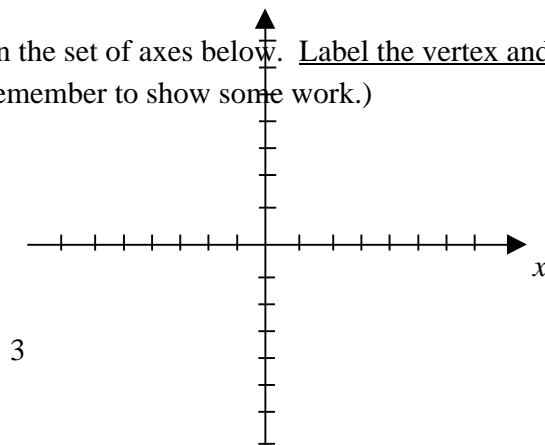
(10 pts) 8. Given the equation of the parabola $y = -2(x+4)^2 + 1$, answer
(4 pts) (a) Find the vertex. Express your answer as an ordered pair.

vertex:

(6 pts) (b) Sketch the graph of the parabola on the set of axes below. <u>Label the vertex and at least two other points on the graph</u>. (Remember to show some work.)

3

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Place your answers in the spaces provided. <u>You must show correct work to receive credit.</u>

(8 pts) 9. If $3800 is invested today into an account that earns an interest rate of 6.5% compounded
quarterly, how much will it be worth after 8 years? Round your answer to the nearest
dollar.

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(12 pts) 10. Jerry purchased a painting for $6095. The painting will appreciate linearly in value to
$8645 after 5 years.

(8 pts) (a) Write a formula for the painting's value, V, in terms of t, where t is the number of
years since the painting was purchased.

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$$V =$$

(4 pts) (b) Use your equation from part (a) to find after how many years the painting will be worth
$10,430.

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