Name _____
Instructor:

Instructions:

- ❑ Show all work, as partial credit will be given where appropriate.

- ❑ If no work is shown, there may be no credit given.

- ❑ All final answers should be written in the space provided on the exam and in simplified form.

DO _NOT_ WRITE IN THIS TABLE!!!
(It is for grading purposes.)

Grade:

1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	

Raw Total (out of 200 points)

Total (percentage)

1. (20 points) Find the inverse, $f^{-1}(x)$ for each given function and state the domain of the both the function and its inverse.

(a) $f(x) = \ln(4x + 6)$

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

Domain of $f^{-1}(x)$: _____

Domain of $f(x)$: _____

(b) $f(x) = \dfrac{x^3 + 6}{x^3 + 1}$

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

Domain of $f^{-1}(x)$: _____

Domain of $f(x)$: _____

2. (20 points) (a) Write the equation of the line that passes through the two points
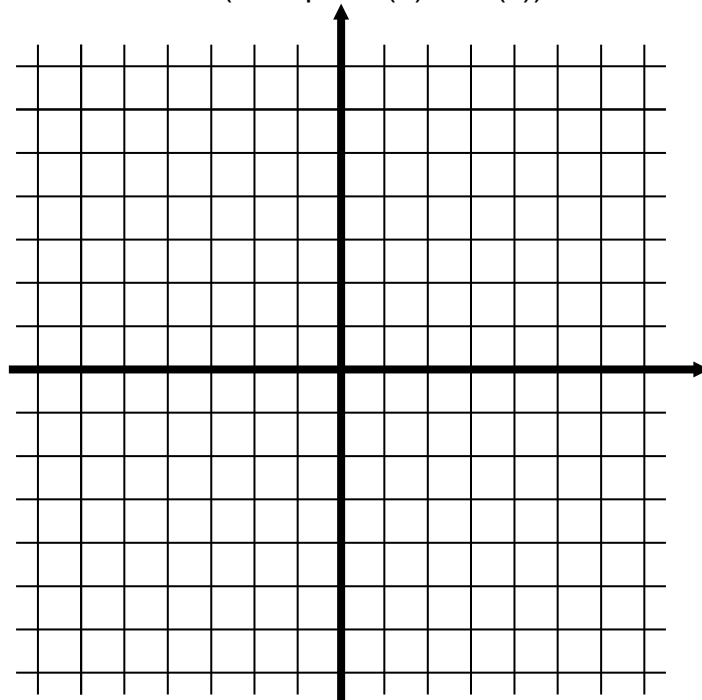(-4, 1) and (60, 17).

Line equation: _____

(b) What is the y-intercept of this line (from part (a))?

y-intercept: _____

(c) Write the equation of the line parallel to the one in part (a) which passes through the origin.

Parallel line: _____

(d) Graph both of these lines (from parts (a) and (c)) on the axes provided.

3. (15 points) For an investment that earns 8% interest compounded monthly, how much should be deposited at the beginning of each month in order to have $150,000 after 16 years?

Monthly deposit: _____

4. (15 points) Solve the following equation.

$\log(2x^2)=3-\log(4x)$

Solution: _____

5. (20 points) Cap'n Bob plans to outfit a pirate ship. The ship, supplies and crew salaries will cost him $35,000 (fixed costs). In addition, every sea battle will cost him $2,700 in gunpowder and hospital bills (variable costs). Cap'n Bob makes $5,200 (on average) in booty per sea battle.

(a) What are Cap'n Bob's cost, profit and revenue functions in terms of the number of battles fought (i.e. let x = number of battles fought)?

Cost function: _____

Revenue function: _____

Profit function: _____

(b) How many battles must Cap'n Bob fight to break even?

battles to break even: _____

5

6. (15 points) Showing all your steps clearly, solve this system of linear equations.

$$2x + 3y + 2z = 0$$
$$x - 6z = 4$$
$$x + y - 2z = 1$$

Solution: _____

7. (15 points) Find the vertex, axis of symmetry and zeros of the parabola

$$y = \frac{-1}{2}(x-6)^2 + 4$$

Vertex: _____

Axis of symmetry: _____

Zeros: _____

8. (20 points) Let $f(x)=4x^2-x+1$, $g(x)=5x-2$, and $h(x)=\dfrac{x}{x^2+1}$. Find the following.

(a) $(fg)(x)$

$(fg)(x)$ = _____

(b) $(g\circ h)(x)$

$(g\circ h)(x)$ = _____

(c) $(f\circ g)(0)$

$(f\circ g)(0)$ = _____

(d) $(f+g)(x)+4$

$(f+g)(x)+4$ = _____

9. (20 points) You are buying your first home. You have found a home that costs $200,000. You have been able to secure a 30-year loan from a bank at an interest rate of 5.5% compounded monthly. You have $10,000 which you will use as a down payment.

(Hint: The principal of the loan will be the cost of the home minus the down payment.)

(a) What will your monthly payment be?

Monthly payment: _____

(b) How much will you pay in interest over the life of the loan?

Total interest paid: _____

10. (20 points) For $A=\begin{bmatrix} 4 & 1 \\ 2 & -1 \\ 0 & 5 \end{bmatrix}$ and $B=\begin{bmatrix} 3 & 0 \\ -5 & 1 \\ 0 & 2 \end{bmatrix}$ compute the following, or explain why they are impossible to calculate.

(a) $2A + B$

$2A + B = $ _____

(b) AB

$AB = $ _____

(c) $B^T A$

$B^T A = $ _____

11. (20 points) Graph the solution set of the following system of inequalities and find and label all vertices of the boundary.

$$y \geq 4x - 2$$
$$2y - 6 \leq 3x$$
$$6x + y \geq -12$$