Math1090 Final Exam
Fall, 2008

Name _____

<u>Instructions:</u>
- ❑ 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 <u>*NOT*</u> WRITE IN THIS TABLE!!!
(It is for grading purposes.)

Grade:

1	
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Total

1) (12 pts) If $f(x)=3-x$ and $g(x)=2x-x^2$, find each of the following, simplifying as far as possible:

(a) $g(-1)$

$$g(-1) \ = \ \underline{\hspace{3cm}}$$

(b) $(f-g)(x)$

$$(f-g)(x) \ = \ \underline{\hspace{4cm}}$$

(c) $g(x-5)$

$$g(x-5) \ = \ \underline{\hspace{4cm}}$$

(Note: This is #1 continued!)

(d) $(f \circ g)(x)$

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

(e) $g(f(x))$

$g(f(x))$ = _____

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

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

2) (8 pts) Given the line $2x + y = 4$:
   (a) Find the equation of the line through the point (-2, 1) that is parallel to the
   given line. *(Give answer in slope-intercept form.)*

(a) line: _____

   (b) Find the equation of the line through the point (0, 4) that is perpendicular
   to the given line. *(Give answer in slope-intercept form.)*

(b) line: _____

3) (10 pts) Solve each equation. (Give <u>exact</u> answers.)

(a) $3x^2+1=-5x$

x = _____

(b) $x^2-13x+36=0$

x = _____

4) (7 pts) The supply and demand for a product are given by $2p-q=27$ and $(2p-5)q=363$, respectively. Find the equilibrium quantity and price.

equilibrium quantity: _____

equilibrium price: _____

5) (10 pts) Joe has a total of $2500 to invest into two accounts, earning simple interest. The accounts have annual interest rates of 5% and 10%. The total interest made from his investments in one year is $200.

   (a) Write the system of equations that describe this scenario. Use x to represent the amount invested at 5% and y to represent the amount invested at 10%.

(b) Write the matrix equation for this system of equations.

(c) Solve the system of equations.

x = _____

y = _____

6) (6 pts) Given the matrices A and B, compute AB − BA.

$$A = \begin{bmatrix} 2 & 1 \\ 3 & 4 \end{bmatrix} \quad \text{and} \quad B = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$$

AB − BA = _____

7) (14 pts) A chocolate truffle maker plans to make truffles for a street fair. She makes two kinds of truffles: a dark one that she sells for $1 a piece, and a lighter chocolate truffle that she sells for 80 cents a piece. She needs 2 teaspoons of heavy whipping cream and 10 grams of chocolate to make a dark truffle and 4 teaspoons of heavy whipping cream and 5 grams of chocolate to make a light truffle. She has a total of 1600 teaspoons of heavy whipping cream and 5000 grams of chocolate that she can use for these truffles.

       (a) Find the inequalities for the constraints. Then, graph the feasible region and label the corner points. (Make sure to define what your variables represent.)

       (b) How many truffles of each kind should she make to maximize revenue and what is that maximum revenue?
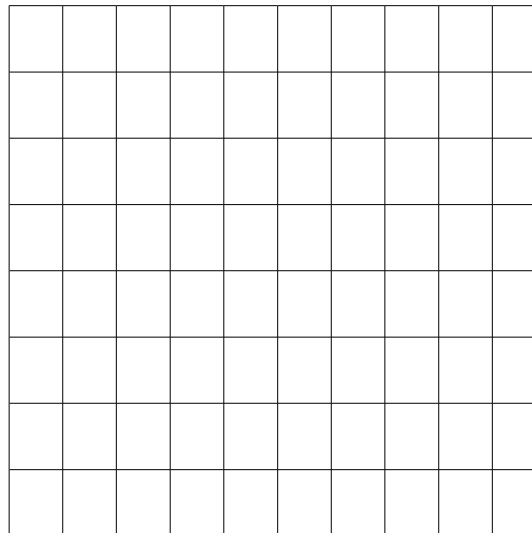
For maximum revenue, # dark truffles = _____,

light truffles = _____

Max revenue = _____

8) (8 pts)   Solve for x.

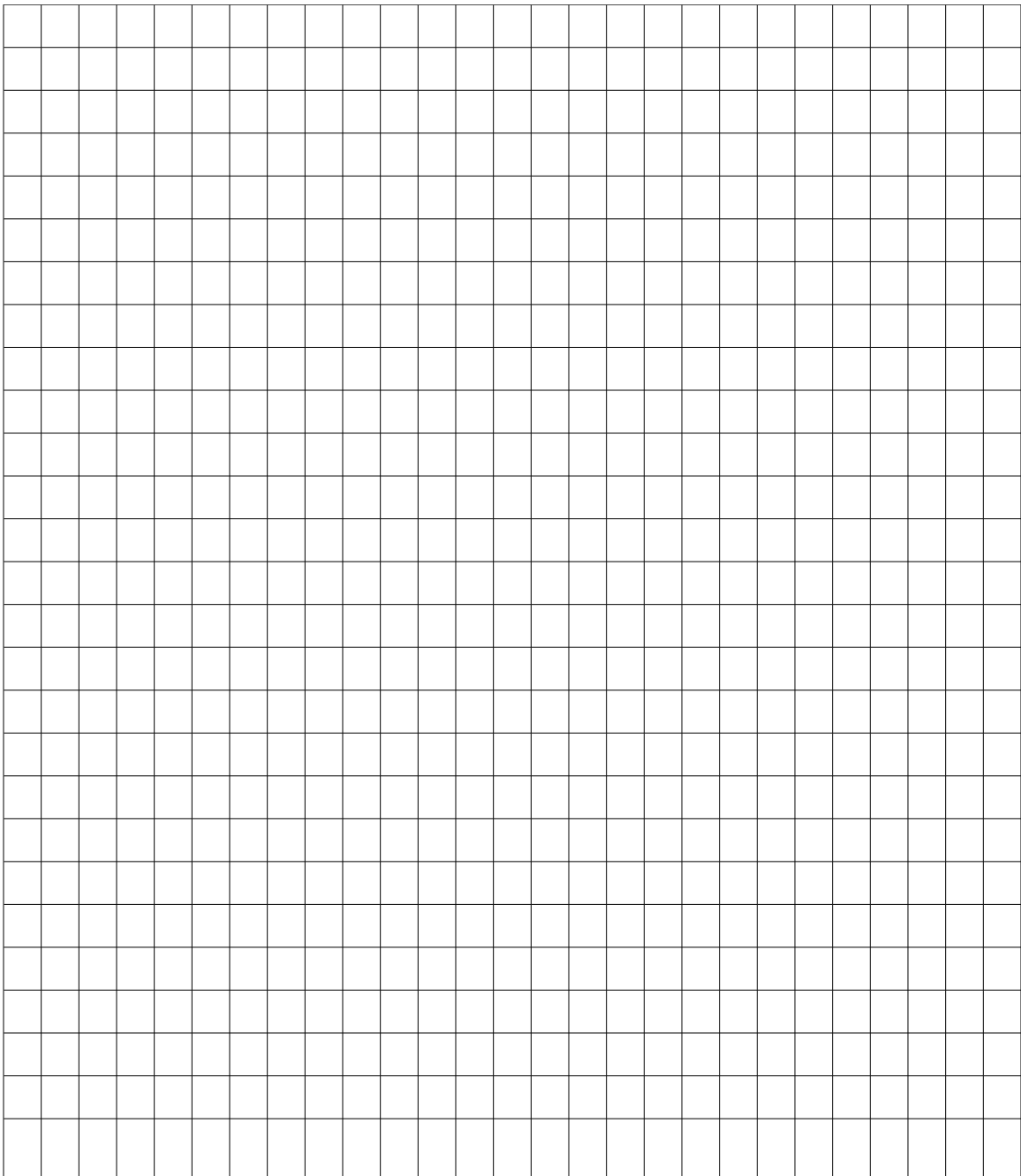(a) $\log_3(x^2) - \log_3(x+3) = \log_3(x-2)$

$x =$ _____

(b) $3^{x^2+x-3} = \dfrac{1}{27}$

$x =$ _____

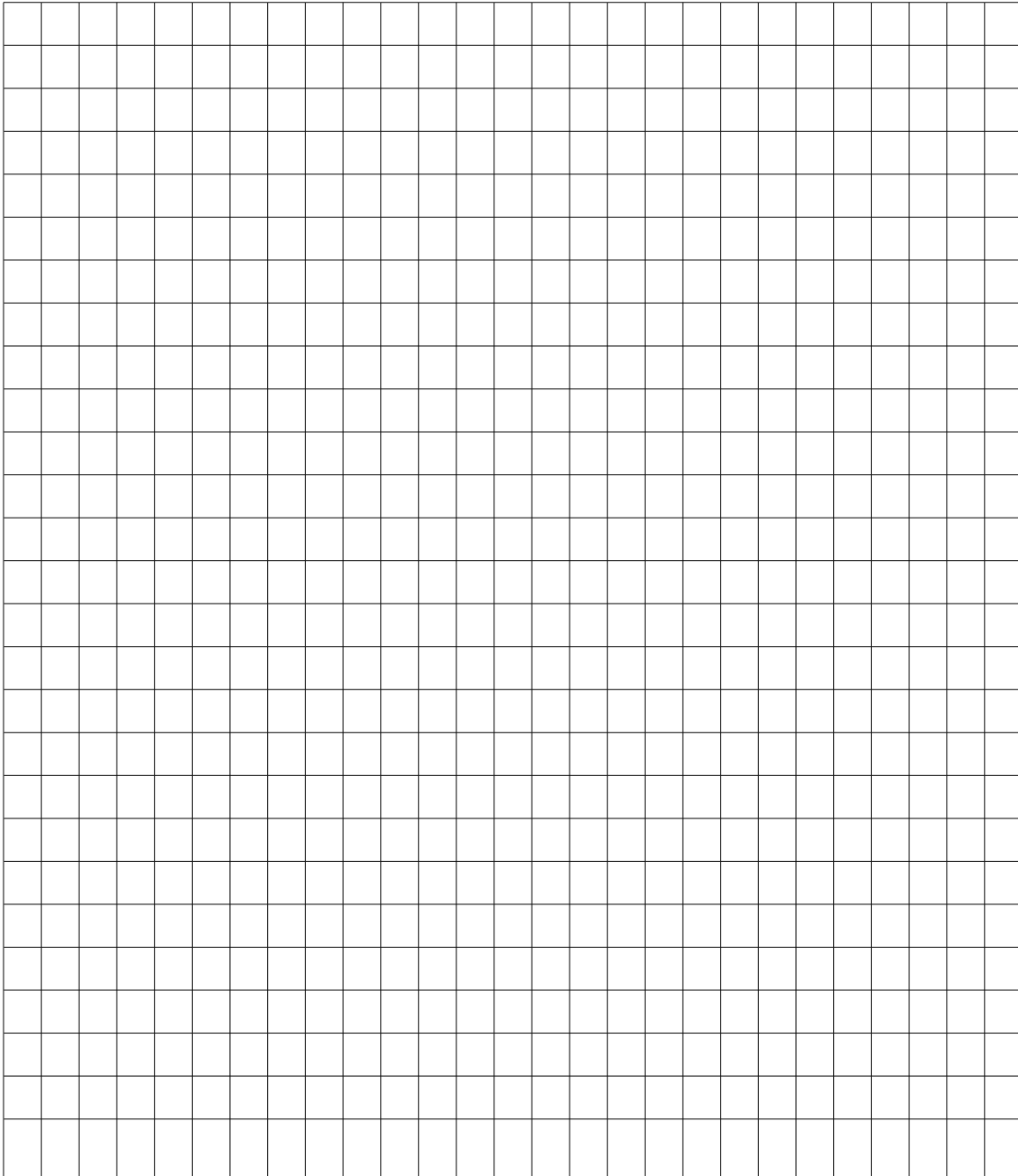9) (10 pts) Sketch the graph of the given functions in the xy-plane. Clearly label (1) two points on each graph and (2) any asymptotes.

(a) $y=3^{-2x}$

(#9 instructions: Sketch the graph of the given function in the xy-plane. Clearly label (1) two points on each graph and (2) any asymptotes.)

(b) $y=\log(x+1)$

10) (5 pts) Paul borrows $40,000 from the bank at an APR of 12% compounded monthly. If the payments on this loan are made at the end of each month, what are his payments if Paul wants to pay off his debt in 4 years? What is the total amount that Paul pays to the bank?

Payment amount = _____

Total paid to bank = _____

11) (10 pts) (a) Dave has a paper route that earns him $1000 per year, which he deposits, at the end of each year, in an account yielding 5% interest compounded annually. He does this for five years, from the age of 14 to 18. If after that he makes no deposits or withdrawals, but leaves the money in the account, how much money does he have when he is 65 years old?

Total for Dave: _____

(b) Dave's brother, Leo, wins a prize of $3,000 in a contest at age 14. He puts this in an account yielding 6% interest compounded annually. If he also makes no withdrawals or deposits, but leaves the money in the account, how much money does he have when he is 65 years old?

Total for Leo: _____