Math1090 Final Exam
Fall, 2006

Name ________________________________

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 and in simplified form.

DO *NOT* WRITE IN THIS TABLE!!!
(It is for grading purposes.)

Grade:

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Total

1) Find all solutions to the following equation and inequality.

(a) $|3x+2|>20$

Answer 1a: ______________________________

(b) $|-2x+6|=|3x+5|$

Answer 1b: ______________________________

2) The Cordova Company sells bicycles. They pay $164 for each bicycle and have monthly fixed costs of $5500. If they sell every bicycle for $185, how many bicycles do they need to sell each month to have a profit of at least $5000?

Answer 2: ______________________________

3) Solve for x. $x^2+3=4x$

Answer 3: ______________________________

4) For the following functions, answer the specified questions.

$f(x)=x^2-1 \qquad g(x)=2\text{x}-1$

(a) What is the domain of $\left(\frac{g}{f}\right)(x)$? ______________________________

(b) $(f \circ g)(x)$ = ________________________

(c) $g^{-1}(x)$ = _________________________

(d) $(f-g)(x)$ = ____________________________

5) Find the x- and y-intercepts and the vertex of $f(x)=2x^2-4x-6$ algebraically. Use this information to sketch a graph of $f(x)$.

x-intercept(s): ______________________________

y-intercept: ________________________________

vertex: ____________________________________

6) A gardener has two fertilizers that contain different concentrations of nitrogen. One is 7% nitrogen and the other is 13% nitrogen. How many pounds of each should she mix together to obtain 27 pounds of 9% concentration?

pounds of 7% nitrogen fertilizer _______________

pounds of 13% nitrogen fertilizer _____________

7) Solve for x.

(a) $\log_2 32 = x$

x = ________________

(b) $27^{x-2} = 9^{3x+9}$

x = ____________________

(c) $\log_{10} 2x + \log_{10}(x-5) = 2$

x = __________________

8) Suppose that $2000 is put into an account earning 6% interest compounded quarterly. How many years will it take for the balance in the account to reach $3000?

Answer 8: ____________________

9) You are buying a $220,000 house with a down payment of $25,000. If the interest rate is 6%, compounded monthly, determine the size of the monthly payments (at the end of the month) you must make over the next 30 years to pay off the house.

Monthly Payment = $ ____________________

10) Mr. Johnson has two debts that he needs to pay off. The first is $5000 for his student loans and it is due in 4 years. The second debt is $3000 for his purebred cat, due in 5 years. If Mr. Johnson wants to pay off both debts with a single payment in two years, how much will his payment be, assuming an interest rate of 9% compounded quarterly?

Payment = $ ______________________

11) Given the matrices A and B, perform the indicated operations or state that it's not possible. If it's not possible, explain why.

$$A=\begin{bmatrix} 1 & 3 \\ -2 & 2 \\ 4 & 1 \end{bmatrix} \quad B=\begin{bmatrix} 0 & 2 & 1 & -1 \\ 3 & 0 & 4 & 2 \end{bmatrix} \quad C=\begin{bmatrix} 4 & -5 & 6 & 0 \\ 7 & 3 & 1 & 4 \end{bmatrix}$$

(a) AB

$AB =$ ______________________________

(b) BA

$BA =$ ______________________________

(c) $2\mathrm{B}-C$

$2\mathrm{B}-C =$ ______________________________

12) Follow the steps below to solve the system of linear equations using an inverse matrix.

$$2x - 5y = 2$$
$$-x + 3y = 1$$

(a) Write the system above as a matrix equation, i.e. In the form $\boldsymbol{A}\begin{bmatrix} x \\ y \end{bmatrix} = \boldsymbol{b}$.

(b) Find $\boldsymbol{A}^{-1}$.

$\boldsymbol{A}^{-1}$ = ______________________________

(c) Use $\boldsymbol{A}^{-1}$ to solve the system of equations.

Solution: ____________________________________

13) Maximize the objective function $P = x + 2y$ subject to the constraints:

$$x \geq 0$$
$$y \geq 0$$
$$x + y \geq 5$$
$$x + y \leq 12$$
$$x \leq 10$$

Maximum value of P = ____________________

at the point ______________________________