MATH114 COLLEGE MATH & STATISTICS 100pts. TEST 2 Fall 2011 INSTRUCTOR: C. MORRIS

NAME: Key

8pts 1. Solve the following system of equations by substitution

3x + 2y = 6
y = 2x – 11

(4, -3)

$3x + 2(2x-11) = 6$
$3x + 4x - 22 = 6$
$7x = 28$
$x = 4 \quad y = -3$

8pts 2. Solve the following system of equations by elimination

7x – y = 2
2x + 5y = 27

(1, 5)

$7x - y = 2 \rightarrow 35x - 5y = 10$
$2x + 5y = 27$
$37x = 37$
$x = 1 \quad y = 5$

8pts 3. There are 25 coins in a child's piggy bank that total $4.45. The coins are all either quarters or nickels. Set up a system of equations and solve it to determine how many of each type of coin there is.

$N + Q = 25$
$5N + 25Q = 445$

$5N + 5Q = 125$
$5N + 25Q = 445$
$-20Q = -320$
$Q = 16$
$N = 9$

16 quarters and 9 Nickels

8pts 4. If the national consumption function is given by **C = 0.5y + 12** (in billions of dollars)

a) What is the national consumption when disposable income is **$50**(billion)?

$.5(50) + 12$ 37 billion

b) What is the marginal propensity to consume?

.5

8pts 5. Graph the solution to the system of inequalities **5x + 3y ≤ 15, x ≥ 0, y ≥ 0** see graph paper

8pts 6. Graph the solution to the system of inequalities **x ≥ 0, y ≥ 0, x + y ≤ 8, y ≥ 2x – 1** see graph paper

6pts 7. Using your information from problem 6 Maximize **C = 5x + 7y**

If you did not do problem 6 then use the following ordered pairs (these are not the right ones) { (0,2) (1,4) (4,5) (3,4) }

$C(\frac{1}{2}, 0) = 5(\frac{1}{2}) + 7(0) = 5/2$
$C(0, 0) = 5(0) + 7(0) = 0$
$C(0, 8) = 5(0) + 7(8) = 56$
$C(3, 5) = 5(3) + 7(5) = 50$

max 56 at (0, 8)

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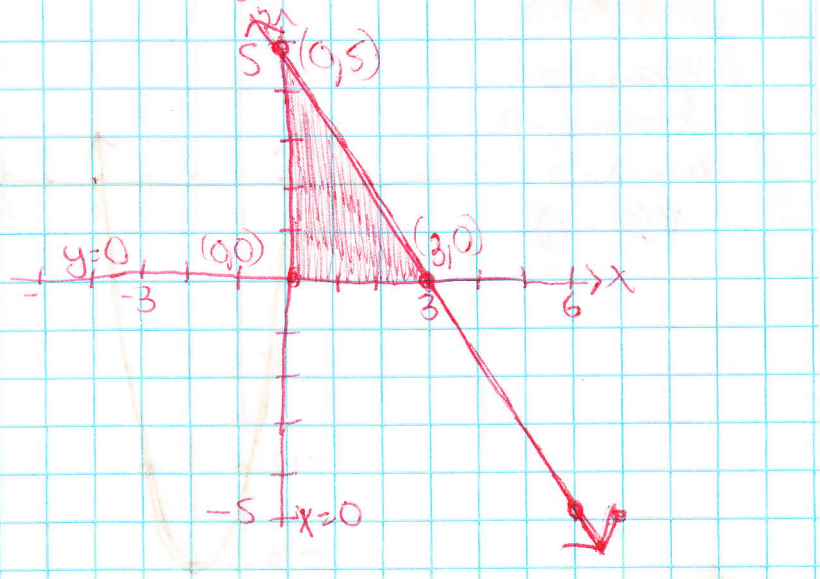
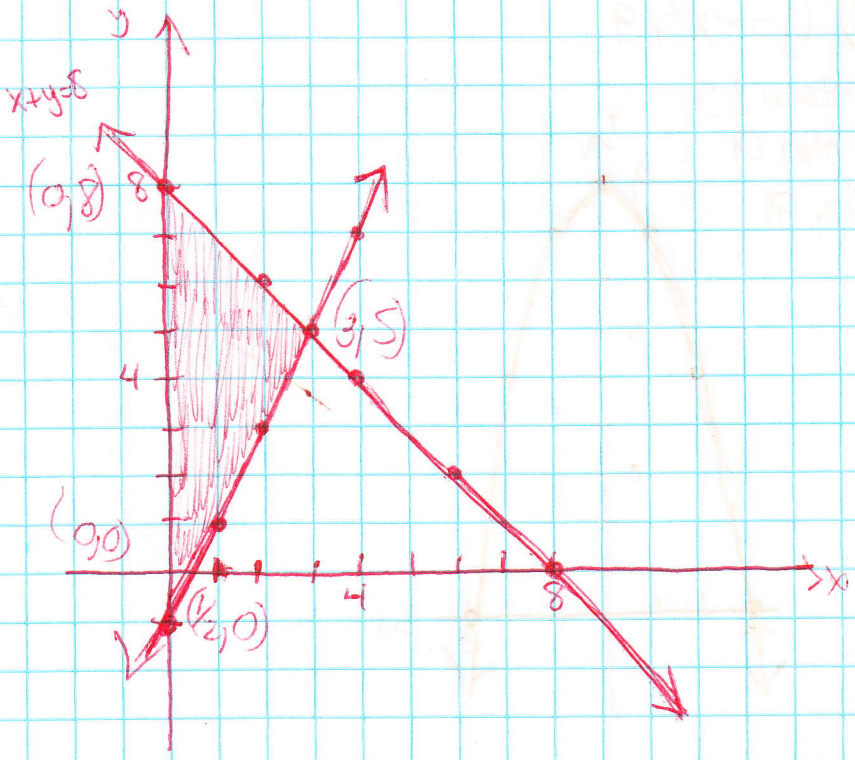
⑤ $5x+3y \leq 15$
$x \geq 0$
$y \geq 0$



⑥ $x \geq 0$ $y \geq 0$
$x+y \leq 8$
$y \geq 2x-1$

$x+2x-1=8$
$3x=9$
$x=3$
$(3,5)$



6pts

(11) $y = x^2 - 4x - 12$

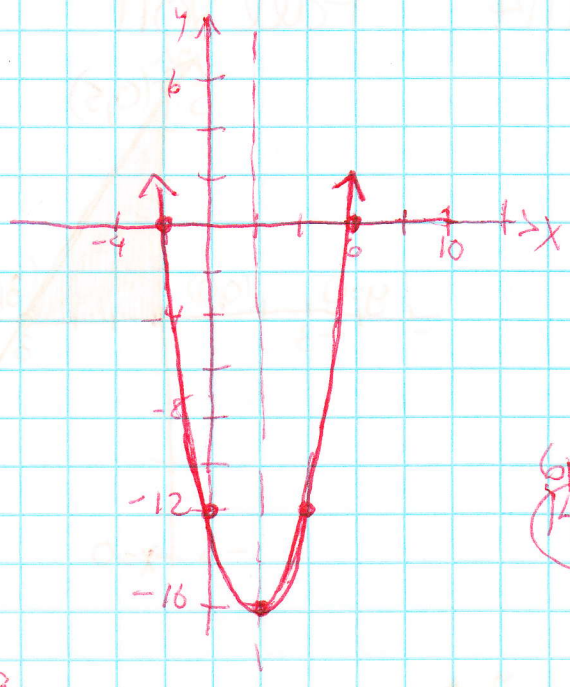
$(x+2)(x-6) = 0$

y inter -12

x inter $6, -2$

axis $x = 2$

$V(2, -16)$



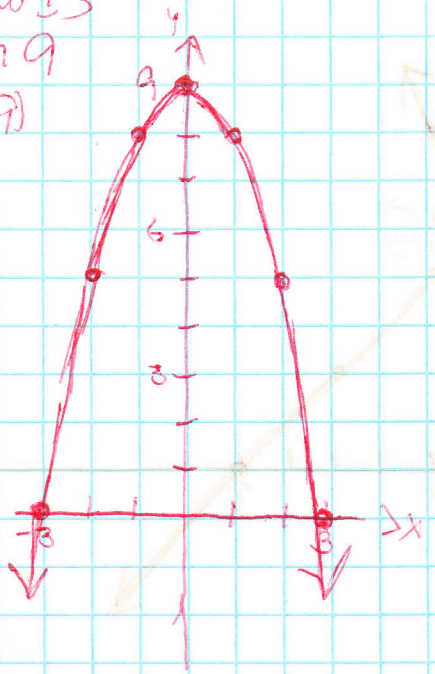
6pts

(12) $y = -x^2 + 9$

x inter ± 3

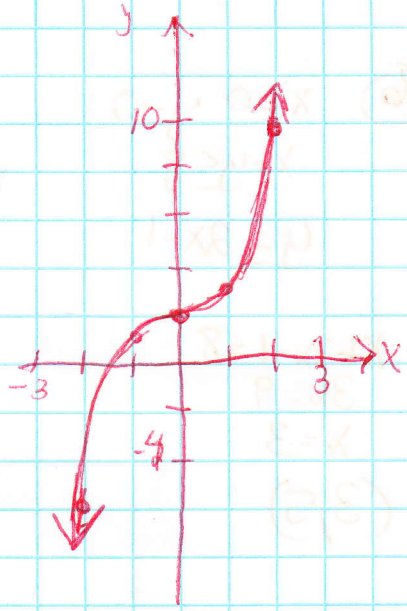
y inter 9

$V(0, 9)$

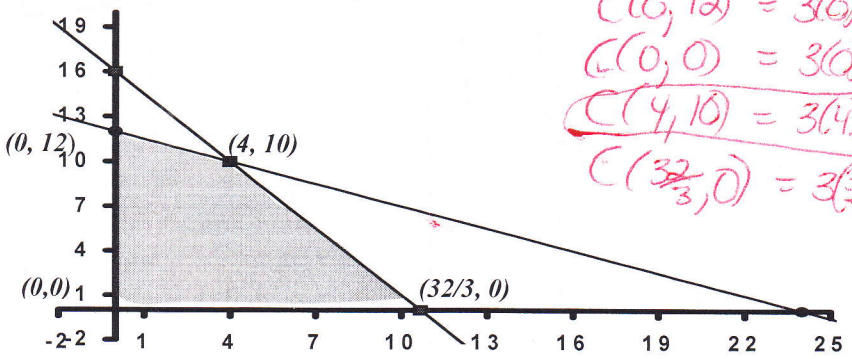


6pts

(14) $y = x^3 + 2$



6pts 8. Find the maximum value of the feasible region shown below using C = 3x + 5y



$C(0,12) = 3(0)+5(12) = 60$

$C(0,0) = 3(0)+5(0) = 0$

$C(4,10) = 3(4)+5(10) = 62$

$C(\frac{32}{3},0) = 3(\frac{32}{3})+5(0) = \frac{96}{3} = 32$

max 62 at (4, 10)

8pts 9. Using the quadratic formula: $x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$ find any solutions to $\mathbf{5x^2 + 19x = 12 + 2x}$

$x = \frac{-17 \pm \sqrt{(17)^2-4(5)(-10)}}{2(5)} = \frac{-17 \pm \sqrt{529}}{10} = \frac{-17 \pm 23}{10}$

$5x^2+17x-12 = 0$

$+3/5$ or -4

8pts 10. Solve by factoring $\mathbf{x^2 - 21x + 54 = 0}$

$(x-3)(x-18)=0$

$x = 3$ or 18

6pts 11. Graph $\mathbf{y = x^2 - 4x - 12}$ See graph paper

axis of symmetry $\mathbf{x = \frac{-b}{2a}}$

6pts 12. Graph $\mathbf{y = -x^2 + 9}$ See graph paper

6pts 13. If the supply function for a commodity is $\mathbf{p = q^2 - 4q + 23}$ and the demand function is $\mathbf{p = -2q^2 + 11q + 173}$ find the equilibrium quantity and price.

$q^2-4q+23 = -2q^2+11q+173$

$3q^2-15q-150=0$

$3(q^2-5q-50)=0$

$3(q-10)(q+5)=0$

$q = 10$ $\quad q \neq -5$

$p = 83$

6pts 14. Graph $\mathbf{y = x^3 + 2}$ See graph paper