Math484.2 September
30,2010 Name:_____Chase Roman_____

Midterm1, 5 problems, 15 points each. Return this page with your name on both sides.

1.)   1. Solve for x where a is a given number:
$$a(a\text{-}1)(a+2)x = a^2 - 1.$$

Solution:

If $a \neq 0$, $a \neq 1$, $a \neq -2$, then $x = \dfrac{a+1}{a(a+2)}$

If $a = 0$, then $0 = -1$ so there are no solutions.

If $a = -2$, then $0 = 3$ so there are no solutions.

If $a = 1$, then $0 = 0$ so every x is a solution.

2.)   2. $4x - y^2 \to \max,$
$x^4 + y^2 = 1.$

Solution:

max = 4
when x = 1 and y = 0

3.) 3, 4. Solve the linear programs given by the following tableaux with all decision variables $x_i \geq 0$:

x_1	x_2	x_3	1	Problem 3
1	0	-1	-2	=- x_4
1	0	-1	-1	-> min

Solution:

The x_3 column is a bad column.
The LP is unbounded. (min = - ∞)

x_1	x_2	-x_3	1	Problem 4
1	0	-1	2	= x_4
1	0	-1	-1	-> min

Solution:
The LP is optimal. $x_1 = x_2 = x_3 = 0$
min = -1, $x_4 = 2$

5.) Find all logical implications between the following 5 constraints on x, y:
(a) $x^4 = y^2$, (b) 0 > -2, (c) 0> 0, (d) x = y, (e) x=y=0.

Solution:

c → a, b, d, e

a, d, e →b

e → a, d