Maltsky

**MATH 114 – FIRST MIDTERM EXAM**
February 27, 2013

**Your name:**

**Circle your TA's name:**

Rui Wang  Sid Kiblawi

- **Be sure to show your work and explain what you did. You will receive reduced or zero credit for unsubstantiated answers.**
- **No books or calculators. You may refer to notes you have brought on one sheet of paper, as announced in class.**

| problem | possible score | score |
|---|---|---|
| 1 | 8, 8 | |
| 2 | 8, 8, 8 | |
| 3 | 8 | |
| 4 | 8, 8 | |
| 5 | 6, 10 | |
| Total | 80 | |

**1.** Factor as nicely as possible

a) $2x^4 - 8x^2$

$2x^2(x^2 - 4)$

$= 2x^2(x+2)(x-2)$

b) $x^5y^2 - xy^6$

$xy^2(x^4 - y^4)$

$= xy^2(x^2 - y^2)(x^2 + y^2)$

$= xy^2(x-y)(x+y)(x^2+y^2)$

**2.** Solve the equations

a) $|2x-5|=3$

Case 1

$2x-5=3$

$2x=8$

$\boxed{x=4}$

Case 2

$-(2x-5)=3$

$2x-5=-3$

$2x=2$

$\boxed{x=1}$

b) $3x^2-7x=6$

$3x^2-7x-6=0$

$x=\frac{7\pm\sqrt{49-4\cdot3(-6)}}{2\cdot3}=\frac{7\pm\sqrt{49+72}}{6}=\frac{7\pm\sqrt{121}}{6}$

$=\boxed{3,-\frac{2}{3}}$

c) $x+3=\frac{-2x^2+7x-3}{x-3}$

$(x+3)(x-3)=-2x^2+7x-3$

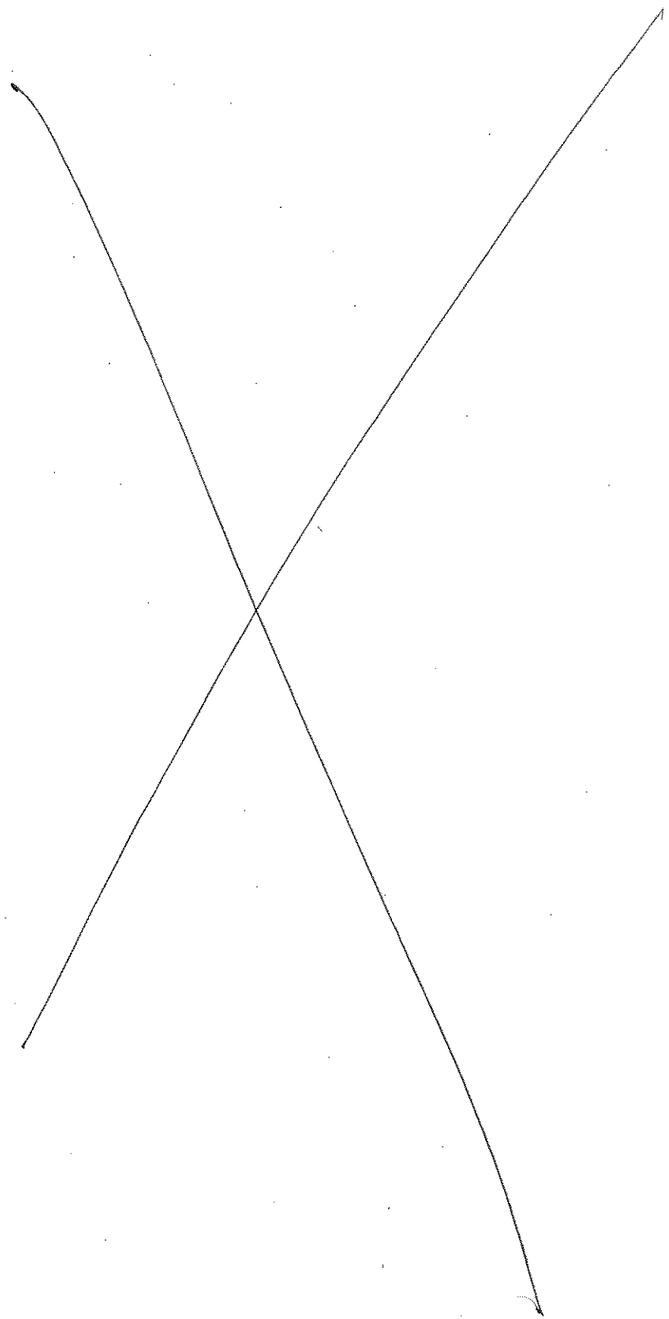
$x^2-9=-2x^2+7x-3$

$3x^2-7x-6=0$

⇝ same as above

$\boxed{x=3,\ -2/3}$

**3.** Find the complex numbers z such that $z^2 + 4z + 5 = 0$.



4. Use $f(x) = 3x - 5$ and $g(x) = 2 - x^2$ to evaluate the expressions

a) f(g(0))

$$f(g(0)) = f(2 - 0^2)$$
$$= f(2)$$
$$= 6 - 5$$
$$= 1$$

b) (f∘f)(x)

$$f(f(x)) = 3(3x - 5) - 5$$
$$= 9x - 20$$

**5.** a) Find all solutions of the following system of equations

$$\begin{cases} x + y = 10 \\ x + 2y = 14 \end{cases}$$

$x + y = 10 \longrightarrow x = 10 - y$

plug into second expression

~~$x + 2y = 14$~~

$10 - y + 2y = 14$

$10 + y = 14$

$y = 4 \rightsquigarrow x = 10 - y = 10 - 4 = 6$

$\boxed{\begin{array}{l} y = 4 \\ x = 6 \end{array}}$

b) Sketch the lines x+y = 10 and x + 2y = 14 on the same graph. Indicate x- and y-intercepts. Put a dot where the lines intersect. Find the x- and y- coordinates of the point of intersection.