

**MATH 06: ALGEBRA AND TRIGONOMETRY. FIRST EXAM. FALL 2014**

1. (30 points) Simplify the following expressions involving radicals:

(a)  $3\sqrt{12}$

(b)  $5\sqrt{2} + 3\sqrt{8} - \sqrt{50}$

(c)  $\sqrt{25m^6n^4}$

(d)  $\sqrt{75m^7n^3}$

(e)  $\sqrt[4]{x^4y^8}$

(f)  $\sqrt[3]{64x^6y^9}$

(g)  $\sqrt[3]{64x^6y^8}$

(h)  $(4 - 2\sqrt{3})(1 + \sqrt{3})$

(i)  $\sqrt{\frac{2x^3y^5}{2x}}$

(j)  $(\sqrt{2} - 5)^2$

2. (10 points) Rationalize the following expressions:

(a)  $\frac{7}{2\sqrt{7}}$

(b)  $\frac{2+\sqrt{3}}{1-\sqrt{3}}$

(c)  $\frac{x}{2\sqrt{x}}$

3. (20 points) Solve the quadratic equations. Indicate if the solutions are real numbers.

(a)  $3x^2 + 2x - 8 = 0$

(b)  $2x^2 - 3x + 4 = 0$

(c)  $x^2 - 4x - 4 = 0$

(d)  $x^2 = x + 1$

4. (20 points) Solve the equations with radicals. Make sure to check all your answers.

(a)  $\sqrt{-4x + 1} = \sqrt{x + 6}$

(b)  $\sqrt{3x + 1} - 1 = x$

5. (20 points) Perform the following operations with complex numbers

(a)  $4 - 3i - (2 - 2i)$

(b)  $(2 - 3i)(2 + 4i)$

(c)  $(1 + 5i)(1 - 5i)$

(d)  $\frac{-2+3i}{3+i}$