Homework: http://math.mnrt.net/

Name _____ _____ raw _____ scaled _____ percent

Math 10 Trimester 2 Exam 1 (160 Points)

Equations - Roots & Coefficients, Inequalities

■ **This is a take home exam. Here are the rules:**

The exam is due at the start of class on _____, 2012.

You may
[1] use your book, your notes, and a calculator while doing the exam,
[2] use any other book while doing the exam,
[3] use the internet to learn more about these topics while doing the exam (not recommended).

You may not
[1] communicate with anyone about these questions until the exams have all been collected. This includes communicating in person, in writing, over the phone, on-line.

■ **Any questions about these rules, just ask me at any time. If you believe there is an error in a question, ask me about it.**

■ **Please work out your solutions as rough drafts on paper other than this exam paper. When you turn in this exam (on this paper) it should be your final draft of your best work.**

■ **Partial credit is given. It is to your advantage to write clear, complete, and concise solutions. Show as much detail as would be needed for a good student at your level to understand your work.**

■ **Calculators are allowed, but only exact answers count. If the answer is $\sqrt{2}$, then $\sqrt{2}$ gets credit and a decimal approximation such as** 1.4142135623730950488 **gets no credit.**

■ **Answers must be completely simplified. No denominators may include radical or complex numbers. All fractions reduced. Simple arithmetic must be completely performed; e.g. write 9 instead of $\sqrt{81}$ and $i\sqrt{7}$ instead of $\sqrt{-7}$.**

■ **The following questions count 16 points each.**

[1] Find all the values of x for which the following statement is true: $x^2 - 4x - 21 \geq 0$.

[2] Factor, using complex numbers if necessary, $x^2 - 2x + 5$.

[3] Find the values of a and b if $2x^3 + ax^2 - bx + 5$ is divisible by $2x^2 - 3x + 1$

[4] Find all values of k for which the equation $x^2 + (2k + 2)x + 3k^2 + 1 = 0$ has two distinct real number roots.

[5] In the complex numbers, find all the fourth roots of 2.

[6] Is $\left(x-\sqrt{5}\right)$ a factor of $x^2-\sqrt{5}\,x-5\,x+5\,\sqrt{5}$? To receive full credit, show why your answer is correct.

[7] Show that the solutions of $4x^2 - (12a + 4)x + 9a^2 + 6a = 0$ differ by 1.

[8] Prove $|x| - |y| \leq |x - y|$.

[9] Prove that if x and y are not both 0, then $x^4 + x^3\, y + x^2\, y^2 + x\, y^3 + y^4 > 0$.

[10] Find the constants $a,\ b,\ c$ such that the following equality is an identity.

$$\frac{5x+2}{x^3+1} = \frac{a}{x+1} + \frac{bx+c}{x^2-x+1}$$