MA 134 – Take Home Prerequisite Review II Name ______________________________

Show your work for credit, writing your final answer in the space provided. If necessary, refer to the indicated sections in your textbook.

1. (Section 2.2) Recall that the number i is defined such that i = ____________, and i^2 = ____________. Complex numbers are then all numbers of the form $a+bi$ with a and b real numbers. The conjugate of the complex number $a+bi$ is ___________. Complex conjugates have the important property that their product is a real number: $(a+bi)(a-bi) = a^2 - abi + abi - b^2 i^2 = a^2 + b^2$. Perform these operations on the complex numbers:

a. $(9+i)+(-3+2i)-(8-5i) =$ ________________

b. $(3+\sqrt{-16})(2-\sqrt{-25}) =$ _________________

c. $(7-i)^2 =$ ______________

d. $\dfrac{2+3i}{4-5i} =$ ________________________

2. (Section 2.3) Recall that in Section R.7 quadratic equations were solved by **factoring**. The polynomials were factorable because the roots were rational numbers. If a quadratic equation cannot be solved by the method of factoring, it is because the solutions involve radicals or complex numbers. One way to solve quadratic equations is by the method of **Completing the Square**. Although this method is generally cumbersome for solving quadratic equations, it will be used in several situations throughout the remainder of the semester.

Study this **Completing the Square** pattern:

$x^2+6x+9 = (x+3)^2$ $\quad$ $x^2+10x+25 = (x+5)^2$

$x^2-6x+9 = (x-3)^2$ $\quad$ $x^2-10x+25 = (x-5)^2$

Following the same pattern, fill in the blanks, being sure to supply the correct signs:

x^2-4x ______ = $(x$ ______$)^2$ $\quad$ x^2+5x ______ = $(x$ ______$)^2$

x^2+14x ______ = $(x$ ______$)^2$ $\quad$ x^2-x ______ = $(x$ ______$)^2$

x^2-2x ______ = $(x$ ______$)^2$ $\quad$ $x^2+5/2x$ ______ = $(x$ ______$)^2$

Following examples 3 and 4 in Section 2.3, solve these equations correctly using completing the square. Show all steps for full credit.

a. $x^2+5=2x$

b. $2x^2-6x+1=0$

3. (Section 2.3) If the method of Completing the Square is applied to the quadratic equation in standard form $ax^2+bx+c=0$ the **Quadratic Formula** is obtained. The **Quadratic Formula s**tates that solutions to the quadratic equation in standard form $ax^2+bx+c=0$ are given by $x=\dfrac{-b\pm\sqrt{b^2-4ac}}{2a}$. Showing all steps for full credit, solve these equations by using the quadratic formula. Notice these are the same polynomial equations as 2*a* and *b* above so you should obtain the same solutions.

a. $x^2+5=2x$

b. $2x^2-6x+1=0$