Test Review 2
Algebra 2B – Burrus

1. Solve using whatever method you like:
   a. $4x^2 + 55 = 32x$
   b. $x^2 + 4x + 5 = 0$
   c. $x^2 - 11x - 42 = 0$
   d. $x^2 + 50x = -609$
   e. $x^2 = 2 + 6x$
   f. $2x^2 + 58 = 20x$
   g. $x^2 + 58 = -6x$

2. a. $(3 + i)^2 =$
   b. $(2 + i)(2 - i) =$
   c. $(9 + i) + (2 - i) =$
   d. $\frac{5}{2 + i} =$
   e. $\frac{26i}{2 + 3i} =$
   f. $(1 + i)^2 =$

3. Tell whether each answer has 2 rational answers, 2 irrational answers, 2 imaginary answers, or only one answer:
   a. $3x^2 + 6x + 3 = 0$
   b. $2x^2 - 7x + 6 = 0$
   c. $10x^2 - 11x + 3 = 0$
   d. $x^2 + 13x + 43 = 0$
   e. $x^2 - 6x - 2 = 0$

4. A rocket is launched from a platform 10 feet high, with an initial velocity of 80 feet/second. Use the formula $h = -16t^2 + v_0 t + h_0$ to answer these questions:
   a. How long is it in the air?
   b. What is the maximum height it reaches?
   c. How long does it take to reach the maximum height?

Algebra 2B
Review 2

1. a) $4x^2+55=32x$

$4x^2-32x+55=0$ (I'm going to complete the square)

$x^2-8x+13.75=0$

$x^2-8x \quad =-13.75$

$x^2-8x+16=16-13.75$

$(x-4)^2=2.25$

$x-4=1.5$ or $x-4=-1.5$

$x=5.5$ or 2.5

b) $x^2+4x+5=0$

$x^2+4x \quad =-5$

$x^2+4x+4=-5+4$

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

$x+2=i$ or $x+2=-i$

$x=-2+i$ or $-2-i$

c) $x^2-11x-42=0$

$(x-14)(x+3)=0$ OR

$x=-3$ or 14

$x^2-11x-42=0 \quad a=1, b=-11, c=-42$

$x=\frac{11\pm\sqrt{121-4(1)(-42)}}{2(1)}=\frac{11\pm 17}{2}=\frac{-6}{2}$ or $\frac{28}{2}$

$=-3$ or 14

d) $x^2+50x=-609$

$x^2+50x+25^2=-609+25^2$

$(x+25)^2=16$

$x+25=4$ or $x+25=-4$

$x=-21$ or -29

e) $x^2=2+6x$

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

$a=1 \quad b=-6 \quad c=-2 \quad x=\frac{6\pm\sqrt{36-4(1)(-2)}}{2}=\frac{6\pm\sqrt{44}}{2}=\frac{6\pm 2\sqrt{11}}{2}$

$=3\pm\sqrt{11}\approx -.3166$ or 6.3166

f) $2x^2+58=20x$

$2x^2-20x+58=0$

$x^2-10x+29=0$

$a=1,\ b=-10,\ c=29 \qquad x=\dfrac{10\pm\sqrt{100-4(1)(29)}}{2(1)}=\dfrac{10\pm\sqrt{-16}}{2(1)}=\dfrac{10\pm\sqrt{16}\cdot\sqrt{-1}}{2}$

$=\dfrac{10\pm 4i}{2}=5\pm 2i$

g) $x^2+58=-6x$

$x^2+6x+58=0$

$x^2+6x \quad =-58$

$x^2+6x+9=-58+9$

$(x+3)^2=-49 \qquad \sqrt{-49}=7i$

$x+3=7i$ or $x+3=-7i$

$x=-3\pm 7i$

2) a) $(3+i)^2=(3+i)(3+i)=9+3i+3i+i^2=9+6i-1=8+6i$

b) $(2+i)(2-i)=4-2i+2i-i^2=4-(-1)=5$

c) $(9+i)+(2-i)=9+2+i-i=11$

d) $\dfrac{5}{2+i}\cdot\dfrac{2-i}{2-i}=\dfrac{10-5i}{4-2i+2i-i^2}=\dfrac{10-5i}{4-(-1)}=\dfrac{10-5i}{5}=2-i$

e) $\dfrac{26i}{2+3i}\cdot\dfrac{2-3i}{2-3i}=\dfrac{52i-78i^2}{4-6i+6i-9i^2}=\dfrac{78+52i}{4+9}=\dfrac{78+52i}{13}=6+4i$

f) $(1+i)^2=(1+i)(1+i)=1+2i+i^2=1+2i-1=2i$

3) All we have to do is look at the discriminant: b^2-4ac. This is the part of the quadratic formula that is under the radical sign.

a) $3x^2+6x+3=0$ $\quad b^2-4ac = 36-4(3)(3) = 0 \rightarrow$ one solution.

b) $2x^2-7x+6=0$ $\quad b^2-4ac = 49-4(2)(6) = 1 \rightarrow$ two rational solutions. (because we can get a rational square root of 1)

c) $10x^2-11x+3=0$ $\quad b^2-4ac = 121-4(10)(3) = 1 \rightarrow$ two rational solutions.

d) $x^2+13x+43=0$ $\quad b^2-4ac = 169-4(1)(43) = -3 \rightarrow$ 2 imaginary answers.

e) $x^2-6x-2=0$ $\quad b^2-4ac = 36-4(1)(-2) = 44 \rightarrow$ 2 irrational answers.

4. $h = -16t^2+V_0t+h_0$ $\quad h_0 = 10$

$h = -16t^2+80t+10$ $\quad V_0 = 80$

a) when it hits the ground, $h=0$, so we're solving $-16t^2+80t+10=0$

$-8t^2+40t+5=0$

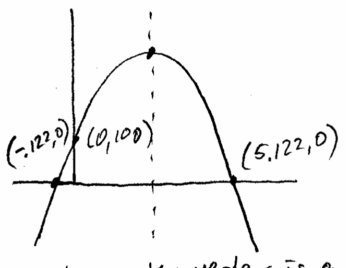
$a=-8, b=40, c=5$

$$x = \frac{-40 \pm \sqrt{1600-4(-8)(5)}}{2(-8)} = \frac{-40 \pm \sqrt{1760}}{-16} \approx \frac{-40 \pm 41.95}{-16}$$

$\approx -.122$ or 5.122

So the rocket stays in the air for 5.122 seconds.

b&c) If we graph the parabola, it looks like the following:



If we can find the coordinates of the vertex, then it will tell us both the maximum height of the rocket (the y-coordinate) and the time it takes to get there (the x-coordinate).

We know the vertex is on the line of symmetry, which is the average of the two x-intercepts. So we take the average of $-.122$ and 5.122: $\frac{-.122+5.122}{2} = 2.5$. That's the x-coordinate.

And we just plug $x=2.5$ into the function to get the y-coordinate:

$$-16(2.5^2)+80(2.5)+10 = 110$$

So the maximum height is 110 feet, and it takes 2.5 seconds to get there.