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GPS # 14 **2.2 SOLVING QUADRATIC EQUATIONS II** Class Time: 11:30 Date: 2-5-08

Useful Guidelines:

The solutions of $ax^2+bx+c=0 (a \neq 0)$ are given by $x=\dfrac{-b\pm\sqrt{b^2-4ac}}{2a}$. "Quadratic Formula"

If *a*, *b*, and *c* are integers, then the number and type of solutions can be predicted as follows:

* If the discriminant $b^2-4ac>0$, then we'll have two real solutions.
* If the discriminant $b^2-4ac=0$, then we'll have only one real solution.
* If the discriminant $b^2-4ac<0$, then we'll have two complex solutions.

$x=\dfrac{-b\pm\sqrt{b^2-4ac}}{2a}$

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Great job!

1. Solve each equation using the quadratic formula and give the solution set.

$x=\dfrac{-b\pm\sqrt{b^2-4ac}}{2a}$

a) $x^2-x-12=0$ $x=\dfrac{-b\pm\sqrt{b^2-4ac}}{2a}$

$a=1$, $b=-1$, $c=-12$

$\dfrac{1\pm\sqrt{(-1)^2-4(1)(-12)}}{2(1)}$

$\dfrac{1\pm\sqrt{49}}{2}=\dfrac{1\pm7}{2}=\{4,-3\}$

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

$a=2$, $b=-3$, $c=3$

$\dfrac{3\pm\sqrt{(-3)^2-4(2)(3)}}{-3(2)}$

$x=\dfrac{3\pm\sqrt{-15}}{4}$

$x=\dfrac{3}{4}\pm\dfrac{i\sqrt{15}}{4}=\dfrac{3}{4}\pm\dfrac{\sqrt{15}}{4}i$

$\left\{\dfrac{3}{4}\pm\dfrac{\sqrt{15}}{4}i\right\}$

2. Use the discriminant to predict whether the solutions to each equation are
A. *one real solution*; B. *two real solutions*; C. *two complex solutions*.

a) $x^2+5x+4=0$ b^2-4ac

$a=1$, $b=5$, $c=4$

$5^2-4(1)(4)=9>0$ 2 real solutions

B

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

$(x+1)(x+4)=0$

b) $2x^2-4x+2=0$ b^2-4ac

$a=2$, $b=-4$, $c=2$

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

$=16-16=0$

1 real solution

A

c) $5x^2-3x+7=0$ b^2-4ac

$a=5$, $b=-3$, $c=7$

$(-3)^2-4(5)(7)=-131<0$ 2 complex solutions

C

d) $x^2+3x-1=0$ b^2-4ac

$a=1$, $b=3$, $c=-1$

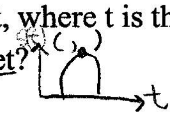
$(3)^2-4(1)(-1)=13>0$ 2 real solutions

A

v. neat!

3. If a ball is thrown upward at 32 feet per second from a height of 6 feet, the height of the ball can be modeled by $S(t)=6+32t-8t^2$ feet, where t is the number of seconds after the ball is thrown. How long after the ball is thrown is the height 36 feet?

t



$t=?$ $s(t)=36$ b^2-4ac

$36=6+32t-8t^2$

$8t^2-32t+30=0$

$2(4t^2-16t+15)=0$

$a=4$, $b=-16$, $c=15$

$4t^2-16t+15=0$

$(-16)^2-4(4)(15)=16=4^2>0$

2 real solutions

$(2t-3)(2t-5)=0$

$2t-3=0$ or $2t-5=0$

$t=\frac{3}{2}$ s or $t=\frac{5}{2}$ s

$\left\{\frac{3}{2}\text{s}, \frac{5}{2}\text{s}\right\}$