Problem 1

$$\frac{4^{x}+2^{2x}}{2^{x}}=\frac{2^{2x}+2^{2x}}{2^{x}}$$

$$=\frac{2^{1}\cdot 2^{2x}}{2^{x}}$$

$$=\frac{2^{2x+1}}{2^{x}}$$

$$=2^{2\cdot x+1-x}$$

$$=2^{x+1} \text{ or } 2\cdot 2^{x}$$

$$\frac{4^{x}+2^{2x}}{2^{x}}=\frac{2^{2x}+2^{2x}}{2^{x}}$$

$$=2^{2x-x}+2^{2x-x}$$

$$=2^{x}+2^{x}=2\cdot 2^{x}$$

Problem 2

$$\frac{2\cdot x^2-5\cdot x-12}{2\cdot x^2-4\cdot x-16}=$$

$$=\frac{2\cdot x^2-5\cdot x-12}{2\cdot \left(x^2-2\cdot x-8\right)}$$

$$=\frac{2\cdot x^2-5\cdot x-12}{2\cdot (x-4)(x+2)}$$

$$=\frac{(2x+3)(x-4)}{2(x-4)(x+2)}$$

$$=\frac{2x+3}{2(x+2)}$$

Problem 3

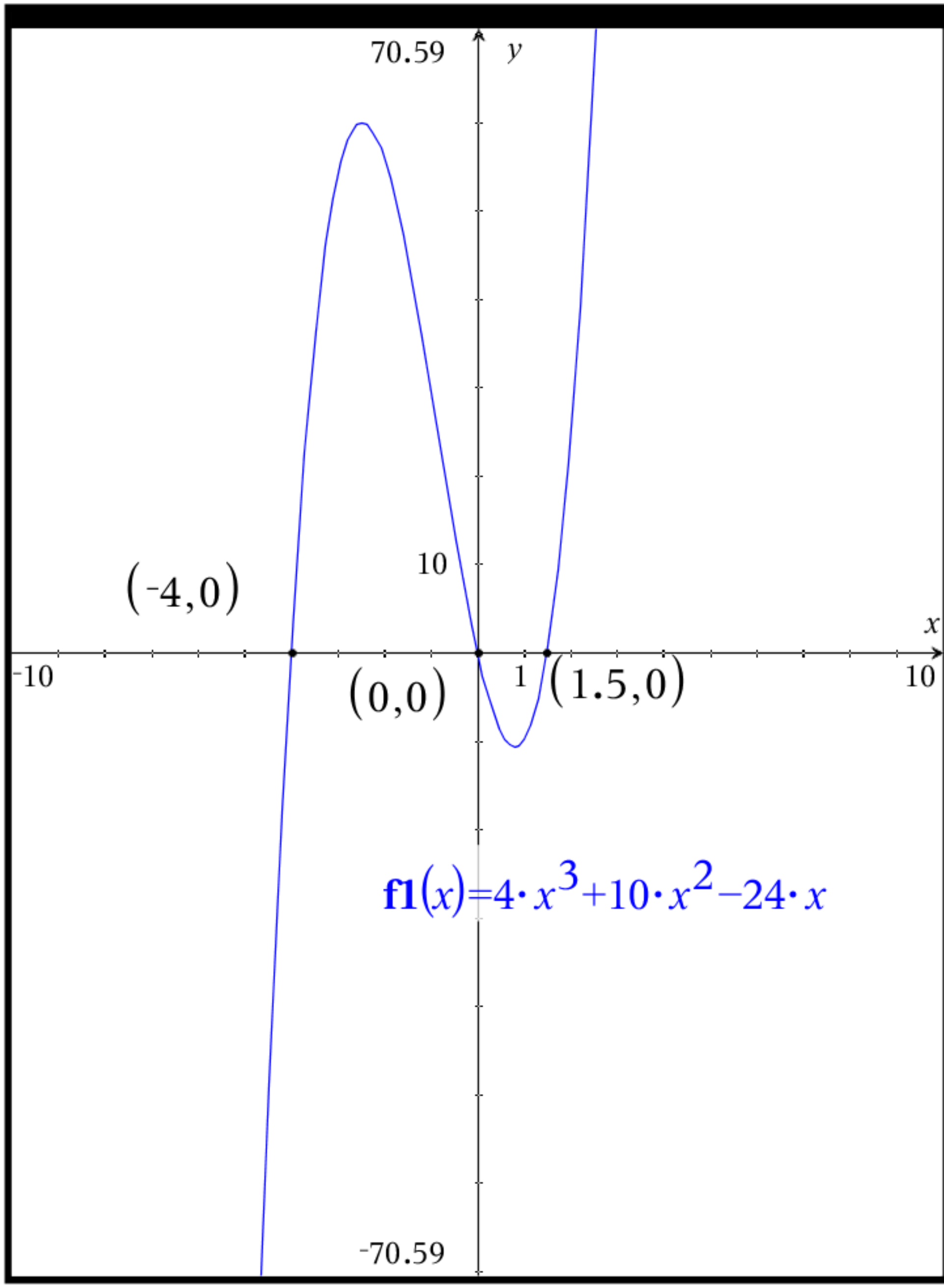
$x^2-4x+13=0$

$b^2-4ac=(^-4)^2-4\cdot 1\cdot 13$ ▸ $^-36$

$$x=\frac{4+\sqrt{^-36}}{2}=\frac{4+6\cdot i}{2}=2+3i$$

$$x=\frac{4-\sqrt{^-36}}{2}=\frac{4-6\cdot i}{2}=2-3i$$

Problem 4



Note: $f(x) = 4x^3+10x^2-24x$

can be written as

$f(x) = 2x(2x^2+5x-12)$

$= 2x(2x-3)(x+4)$

$f(x) = 0$ at $x = -4$, 0, and 1.5

$f(x) > 0$ when $-4 < x < 0$ or $x > 1.5$

$f(x) < 0$ when $x < -4$ or $0 < x < 1.5$

When dealing with quadratic height models, there are three pretty typical questions that are asked of you.

1) How high does the projectile reach?

This is y of the vertex

x = $\frac{-b}{2a} = \frac{^{-}46}{2\cdot{}^{-}16.}$ ▸ 1.4375

f(1.4375)=$^{-}16\cdot(1.4375)^2+46\cdot 1.4375+6 = 39.0625$

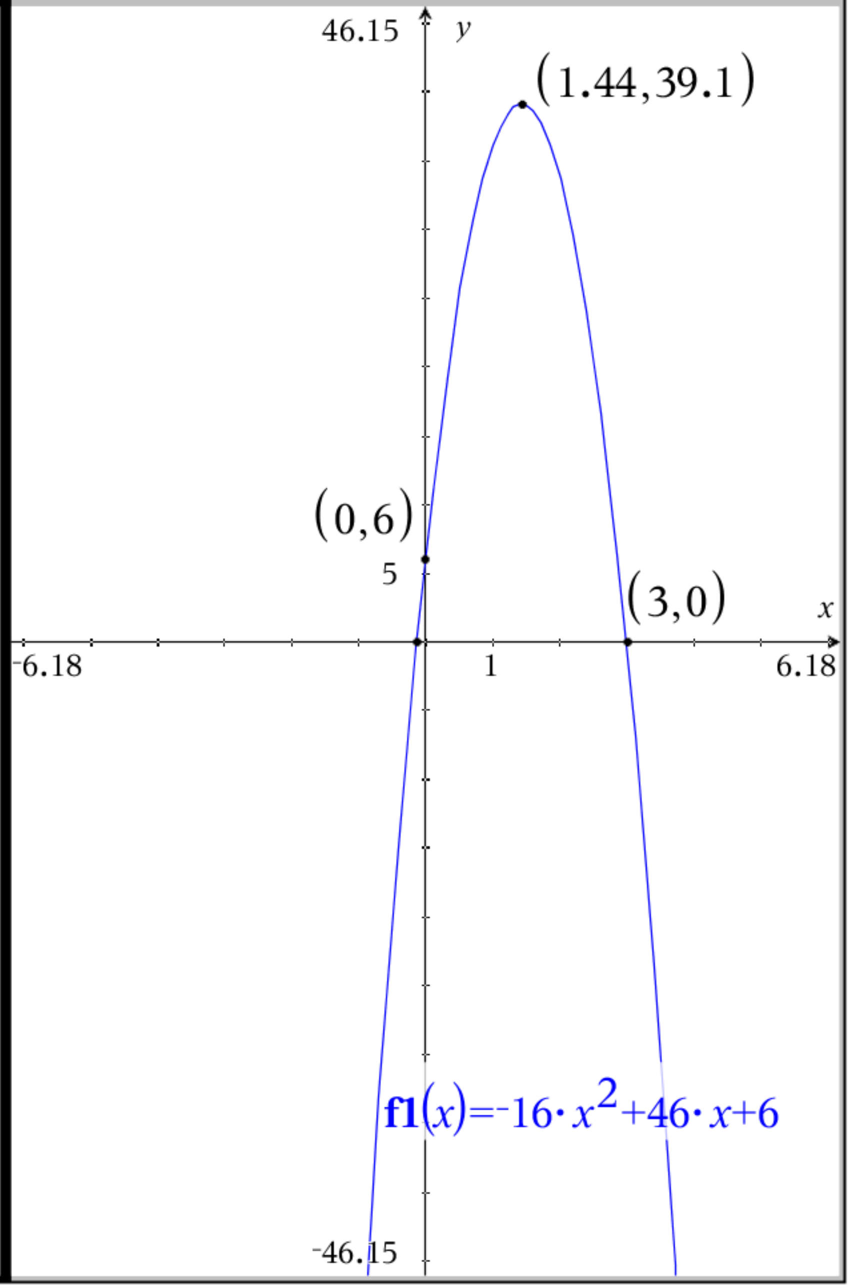
2) When does the projectile reach its maximum?

This is the x of the vertex

3) When does the projectile return to the ground?

this is the solution(s) to 0=$-16x^2+46x+6$

Now this can be found a variety of ways



3) When does the projectile return to the ground?

this is the solution(s) to $0=-16x^2+46x+6$

Now this can be found a variety of ways

Since there were math teachers involved, we got a "nice" answer because believe it or not

$-16x^2+46x+6=0$ is factorable!

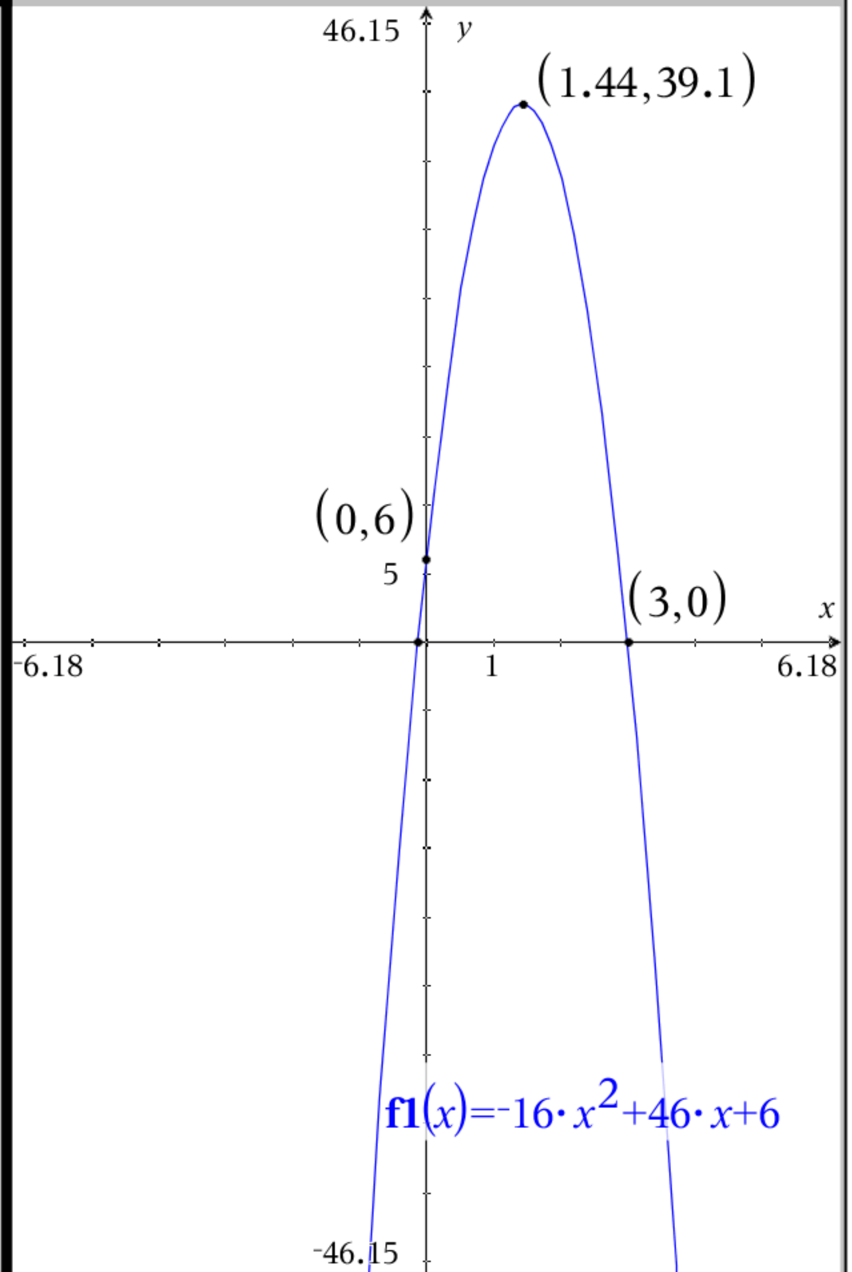
$-2(8x^2-23x-3)=-2(8x+1)(x-3)=0$

this means there are solutions at x = $\frac{-1}{8}$ and x = 3

Since we can take for granted anything that happens before x = 0 we keep the answer x = 3

f(3) = $^{-}16\cdot 3^2+46\cdot 3+6$ ▸ 0

Now I doubt many of would choose the factoring route



3) When does the projectile return to the ground?

this is the solution(s) to 0=$-16x^2+46x+6$

Now this can be found a variety of ways

Some would have used the quadratic formula

a = −16 b = 46 c = 6

$$x = \frac{-b \pm \sqrt{b^2 - 4 \cdot a \cdot c}}{2 \cdot a}$$

I personally do the discriminant first to make the typing in the calculator easier

$b^2-4ac = 46^2 - 4 \cdot {}^-16 \cdot 6$ ▸ 2500 (again math teachers are involved this is why this is NICE)

$$x = \frac{-46 \pm \sqrt{2500}}{2 \cdot (-16)}$$

$$x = \frac{-46 + \sqrt{2500}}{2 \cdot -16} = \frac{-1}{8} \quad \text{or } x = \frac{-46 - \sqrt{2500}}{2 \cdot -16} = 3$$