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Quadratic Formula / System of Equations

Examples and Vocabulary	Notes/Comments/Questions
<u>Quadratic Formula</u> The solutions to the equation $ax^2 + bx + c = 0, a \neq 0$ are $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$	
① Find the x-intercepts of the parabolas f and k. a. $f(x) = 2x^2 - 4x - 1$ $0 = 2x^2 - 4x - 1$ $x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(2)(-1)}}{2(2)}$ $= \frac{4 \pm \sqrt{16 + 8}}{4}$ $\frac{2 \pm \sqrt{6}}{2} = \frac{2(2 \pm \sqrt{6})}{4} = \frac{4 \pm 2\sqrt{6}}{4}$	y-int. = -1 vertex = $\left(\frac{-(-4)}{2(2)}, -3\right) = (1, -3)$ $a = 2 > 0$ $b = -4$ $c = -1$ $[-1, 3, 1] \times [4, 1, 1]$ graphing window $= \frac{4 \pm \sqrt{24}}{4} \sim \frac{4 \pm 4.90}{4}$ $= \frac{8.90}{4}, \frac{-0.90}{4}$ $\approx 2.23, -0.23$

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Examples and Vocabulary	Notes/Comments/Questions
$b. k(x) = -\frac{1}{2}x^2 - x + 2$ $0 = -\frac{1}{2}x^2 - x + 2$ $a = -\frac{1}{2}$ $b = -1$ $c = 2$ $x = \frac{-(-1) \pm \sqrt{(-1)^2 - 4(-\frac{1}{2})(2)}}{2(-\frac{1}{2})}$ $\text{vertex} = \left(\frac{-(-1)}{2(-\frac{1}{2})}, \frac{1}{-1} = -1, \right.$ $\left. 2.5 \right)$ $= (-1, 2.5)$ $[-4, 2, 1] \times [-1, 3, 1]$ graphing window	$y\text{-int.} = 2$ $\text{vertex} = (-1, 2.5)$ $x\text{-ints.} \approx -3.24, 1.24$ $= \frac{1 \pm \sqrt{1 + 4}}{-1}$ $= \frac{1 \pm \sqrt{5}}{-1} \sim \frac{1 \pm 2.24}{-1}$ $= \frac{3.24}{-1}, \frac{-1.24}{-1}$ $= -3.24, 1.24$

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Examples and Vocabulary	Notes/Comments/Questions
② Find the domain of the function $f(x) = \frac{x}{3x^2 - 6x - 2}$ $3x^2 - 6x - 2 = 0$ $x = \frac{-(-6) \pm \sqrt{(-6)^2 - 4(3)(-2)}}{2(3)}$	domain: $x \neq \frac{6 + \sqrt{60}}{6}, \frac{6 - \sqrt{60}}{6}$ $a = 3$ $b = -6$ $c = -2$ $= \frac{6 \pm \sqrt{36 + 24}}{6}$ $= \frac{6 \pm \sqrt{60}}{6}$ $= \frac{6 \pm \sqrt{4 \cdot 15}}{6}$ $= \frac{6 \pm 2\sqrt{15}}{6}$ $= \frac{2(3 \pm \sqrt{15})}{6}$ $= \frac{3 \pm \sqrt{15}}{3}$
③ Solve for T $T^2 - kT - k^2 = 0$ $T = \frac{-(-k) \pm \sqrt{(-k)^2 - 4(1)(-k^2)}}{2(1)}$ $T = \frac{k \pm \sqrt{k^2 + 4k^2}}{2}$ $T = \frac{k \pm \sqrt{5k^2}}{2} = \frac{k \pm k\sqrt{5}}{2}$	$a = 1$ $b = -k$ $c = -k^2$

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Examples and Vocabulary	Notes/Comments/Questions
④ Find the formula for the parabola passing through $(-2, 22)$, $(2, -2)$, and $(4, 22)$. $y = f(x) = ax^2 + bx + c = 3x^2 - 6x + 2$ $22 = f(-2) = a(-2)^2 + b(-2) + c = 4a - 2b + c$ $-2 = f(2) = a(2)^2 + b(2) + c = 4a + 2b + c$ $22 = f(4) = a(4)^2 + b(4) + c = 16a + 4b + c$	
$\begin{cases} 4a - 2b + c = 22 \\ 4a + 2b + c = -2 \\ 16a + 4b + c = 22 \end{cases}$	$\begin{aligned} a &= 3 \\ b &= -6 \\ c &= 2 \end{aligned}$

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Examples and Vocabulary	Notes/Comments/Questions

⑤ Find the formula for the parabola passing through $(-1, 5)$, $(1, 3)$, $(2, -1)$.

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Examples and Vocabulary	Notes/Comments/Questions
⑥ Find an appropriate graphing window for the parabola found in Problem 5.	