Determine the vertex of the function

$$y = 5x^2 - 30x + 54$$

$-6 \div 2 = -3$
$(-3)^2 = 9$
add/subtract 9

$y = 5(x^2 - 6x) + 54$

$y = 5(x^2 - 6x + 9 - 9) + 54$

$y = 5((x-3)^2 - 9) + 54$

$y = 5(x-3)^2 - 45 + 54$

$y = 5(x-3)^2 + 9$

$V(3, 9)$

Determine the vertex of the function $f(x) = -x^2 + 8x - 5$

Using formulas

$$h = \frac{-b}{2a} \quad \text{and} \quad k = \frac{4ac - b^2}{4a} \quad \text{or} \quad k = f(h)$$

$$f(x) = \underset{a}{-1}x^2 \underset{b}{+8}x \underset{c}{-5}$$

$$h = \frac{-b}{2a} = \frac{-8}{-2}$$

$$h = +\frac{8}{2} = 4$$

$$k = \frac{4ac - b^2}{4a} = \frac{\overbrace{4(-1)(-5)}^{20} - \overset{-64}{(8)^2}}{-4}$$

$$k = \frac{20 - 64}{-4} = \frac{-44}{-4} = 11$$

$$\therefore \boxed{V(4,11)}$$

What is the vertex of the function $f(x)=\overset{a}{5}x^2\overset{b}{-3}x+\overset{c}{11}$?

$h=-\dfrac{b}{2a}$

$k=\dfrac{4ac-b^2}{4a}$

$$h=\frac{-(-3)}{10}=\frac{3}{10}=0.3$$

$$k=f(h) \longrightarrow k=f(0.3)=5(0.3)^2-3(0.3)+11$$

$$k=5(0.09)-0.9+11$$

$$k=0.45-0.9+11$$

$$k=10.55=\frac{211}{20}$$

$$\therefore \boxed{V(0.3,10.55)}$$

Write $f(x)=\frac{2}{3}(x-6)^2+1$ in general form.

$f(x)=\frac{2}{3}(x-6)^2+1$

$f(x)=\frac{2}{3}(x^2-12x+36)+1$

$f(x)=\frac{2}{3}x^2-8x+24+1$

$\boxed{f(x)=\frac{2}{3}x^2-8x+25}$

Write $f(x)=-0.5x^2+7x-25$ in standard form.

① completing the square

$f(x)=-0.5(x^2-14x)-25$

or

② $a=-0.5$ $h=\frac{-7}{-1}=7$

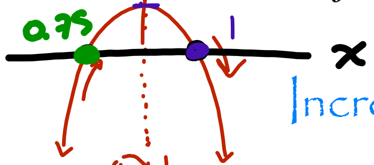
$k=\frac{4(-0.5)(-25)-(7)^2}{4(-0.5)}$

$k=\frac{50-49}{-2}$

$=-\frac{1}{2}$ or -0.5

$\boxed{f(x)=-0.5(x-7)^2-0.5}$

Provide a study of the function $f(x) = \underbrace{-4}_{a=}x^2 + 7x - 3$



Dom: $\mathbb{R}$

Ran: $]-\infty, \frac{1}{16}]$

Max: $\frac{1}{16}$

Min: None

Positive: $[0.75, 1]$

Negative: $]-\infty, 0.75] \cup [1, +\infty[$

(h) k =

$h = \frac{-7}{-8} = \frac{7}{8}$

$k = \frac{4(-4)(-3) - 7^2}{4(-4)} = \frac{-1}{-16} = \frac{1}{16}$

Increasing: $]-\infty, \frac{7}{8}]$

Decreasing: $[\frac{7}{8}, +\infty[$

y-intercept: $x=0$ -3

Zero(s): $\{0.75, 1\}$

Axis of Symmetry: $x = \frac{7}{8}$

let y=0 $0 = -4x^2 + 7x - 3$

$x = \frac{-7 \pm \sqrt{49 - 4(-4)(-3)}}{-8}$

$x = \frac{-7 \pm \sqrt{1}}{-8} \Rightarrow \frac{-7 \pm 1}{-8}$

① $m \times n = 12$
$m + n = 7$
$4, 3$

② Quad form

Sally realises that the amount of money in her bank account follows the trend $f(x)=16x^2-160x+450$, where x is the number of months gone by since December 31st. This trend applies for $x \in [0,12]$.

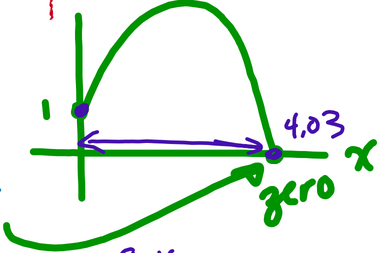
a) How much money did she have at the beginning of this year? Time = 0 ⇒ initial value aka y-int = \$450

b) What was the most money she had in her account this year? Not the vertex b/c at ∪
check x=12 $f(12)=16(144)-160(12)+450=$ \$834

c) How much money did she have in October?
October = month 10 let x=10
$f(10)=16(100)-160(10)+450$
\$ = 450

The rule of correspondence $h(t) = -8t^2 + 32t + 1$ describes the relation between the height, $h(t)$ in metres, of a baseball and the time, t in seconds, elapsed since it was hit.

a-



a) How long does the ball stay in the air?

$$h(t) = -8t^2 + 32t + 1$$

let h(t) or y = 0

$$0 = -8t^2 + 32t + 1$$

factor? $m \times n: -8$ x
$m + n: 32$

Quad form

$$t = \frac{-32 \pm \sqrt{1024 - 4(-8)(1)}}{-16}$$

$$t = \frac{-32 \pm \sqrt{1056}}{-16}$$

$$= \frac{-32 \pm 32.5}{-16}$$

$$t_1 = \frac{-32 - 32.5}{-16} = \frac{-64.5}{-16} = 4.03\,s$$

$$t_2 = \frac{-32 + 32.5}{-16} = \frac{0.5}{-16} = -0.03\,s$$

$$\boxed{4.03\,s}$$