

$x^2 - 3x - 4 = 0$   
 $a = 1, b = -3, c = -4$   
 $\Delta = b^2 - 4ac = (-3)^2 - 4(1)(-4) = 9 + 16 = 25$   
 $\sqrt{\Delta} = 5$   
 $x = \frac{-b \pm \sqrt{\Delta}}{2a} = \frac{3 \pm 5}{2}$   
 $x_1 = \frac{3+5}{2} = 4, x_2 = \frac{3-5}{2} = -1$

$ax^2 + bx + c = 0$  if  $a \neq 0$  then  $1/a$

$\left(\frac{x+b}{2a}\right)^2 = \frac{b^2 - 4ac}{4a^2}$   
 $x + \frac{b}{2a} = \pm \sqrt{\frac{b^2 - 4ac}{4a^2}}$

$x + \frac{b}{2a} = \frac{\sqrt{b^2 - 4ac}}{2a}$  or  $x + \frac{b}{2a} = -\frac{\sqrt{b^2 - 4ac}}{2a}$   
 $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$f(x) = |x^2 - 4x + 3|$  so  $f(x) \geq 1$

$|x^2 - 4x + 3| \geq 1, f(x) \geq 0$  so  $x \leq 1$  or  $x \geq 3$

$f(1) = |1^2 - 4(1) + 3| = 0$   
 $f(2) = |2^2 - 4(2) + 3| = 1$   
 $f(3) = |3^2 - 4(3) + 3| = 0$   
 $f(4) = |4^2 - 4(4) + 3| = 3$

$x^2 - 4x + 3 \geq 0$  so  $x \geq 3$   
 $-(x^2 - 4x + 3) \geq 0$  so  $x \leq 1$

$\lim_{x \rightarrow 2} \frac{f(x)}{x-2} = \lim_{x \rightarrow 2} \frac{x^2 - 4x + 3}{x^2 - 4x + 3} = \frac{x^4 - 4x^3 - 42x + 9}{x^2 - 4x + 3} = \frac{(x-2)(x^2 - 4x + 2) + (-73)}{(x-2)}$

$\frac{x^4 - 4x^3 - 42x + 9}{x^2 - 4x + 3} = (x-2)(x^2 - 4x + 2) + (-73)$

$$\begin{array}{r} x^4 - 4x^3 - 42x + 9 \\ -x^3 + 4x^2 \\ \hline x - 42x + 9 \\ -41x + 9 \\ \hline x - 25 \\ -x + 2 \\ \hline -23 \end{array}$$

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