

Given

x = -3

Notebook

$x^3 + 3x^2 - 4x - 12$

$-3 \overline{) 1 \quad 3 \quad -4 \quad -12}$
 $\quad \underline{1 \quad 0 \quad -4 \quad 12}$
 $\quad \quad \quad \underline{0 \quad -4 \quad 10}$
 $\quad \quad \quad \quad \underline{-4 \quad -3}$
 $\quad \quad \quad \quad \quad \quad \underline{0 \quad 0 \quad 0 \quad 0}$

Bring first one down
 $2 \cdot -3$
 $0 \cdot -4$
 $-4 \cdot -3$
 ← no remainder

Synthetic Division w/out Using Long div.

$x^2 + 0x - 4$
 $x^2 - 4$
 $(x + 2)(x - 2)$
 $x + 2 = 0 \quad x - 2 = 0$

x = -1

$x^3 + 6x^2 + 11x + 6$

$-1 \overline{) 1 \quad 6 \quad 11 \quad 6}$
 $\quad \underline{1 \quad -1 \quad -5 \quad -6}$
 $\quad \quad \quad \underline{5 \quad 6 \quad 0}$
 $\quad \quad \quad \quad \underline{6 \quad 6 \quad 0}$
 $\quad \quad \quad \quad \quad \underline{0 \quad 0 \quad 0}$

$x^2 + 5x + 6$
 $(x + 2)(x + 3)$
 $x = -2 \quad x = -3$

Multiplies to get
 adds to get
 Given 3 Quadratic Formula

$x^3 + 3x^2 - 14x - 12$

$3 \overline{) 1 \quad 3 \quad -14 \quad -12}$
 $\quad \underline{1 \quad 3 \quad 18 \quad 12}$
 $\quad \quad \quad \underline{1 \quad 6 \quad 4 \quad 0}$

$x^2 + 6x + 4$
 $\uparrow \quad \uparrow \quad \uparrow$
 $\underline{a} = 1 \quad \underline{b} = 6 \quad \underline{c} = 4$

~~$\frac{4}{6}$~~

$-3 \pm \sqrt{5}$

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

$\frac{-6 \pm \sqrt{36 - 4(1)(4)}}{2}$

$\frac{-6 \pm \sqrt{20}}{2} \rightarrow \frac{\sqrt{4 \cdot 5}}{2 \sqrt{5}}$

$\frac{-6 \pm 2\sqrt{5}}{2}$

$$\text{roots} = 3, +\sqrt{3}, -\sqrt{3}$$

3

8.

Factor $(x-3)$

$$x^3 - 3x^2 - 3x + 9$$

$$\begin{array}{r|rrrr} 3 & 1 & -3 & -3 & 9 \\ & 1 & 3 & 0 & -9 \\ \hline & 1 & 0 & -3 & 0 \end{array}$$

$$x^2 + 0x - 3$$

$$x^2 - 3$$

$$a=1 \quad b=0 \quad c=-3$$

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

$$x = \frac{-0 \pm \sqrt{0^2 - 4(1)(-3)}}{2}$$

$$\quad \quad \quad \frac{-4(-3)}{-4(-3)}$$

$$\quad \quad \quad \frac{\pm \sqrt{12}}{2}$$

$$\frac{\pm \sqrt{3}}{1}$$

$$\pm \sqrt{3}$$

Given roots First

$$3, -4, 0 \quad (x-3)(x+4)x$$

$$(x) x^2 - 3x + 4x - 12$$

$$x^3 - 3x^2 + 4x - 12$$

$$\begin{array}{r} x=3 \\ -3 \quad -3 \\ \hline x-3=0 \end{array} \quad \begin{array}{r} x=-4 \\ +4 \quad +4 \\ \hline x+4=0 \end{array}$$

11-15-16

Tape Deck tuesday

In the mixed-tape of your life, what three songs best describe your life? why?

starting

① $4x^2 - 25$

square root of both numbers

$(2x+5)(2x-5)$

② $1000x^3 - y^3$

$a=10x \quad b=y$

$(10x-y)(100x^2+10xy+y^2)$

$(a-b)(a^2+ab+b^2)$

③ $a^2x^2 - b^2$

$(ax+b)(ax-b)$

bring in more steps.

⑧ $4x^2 - 9$

set them for zero

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

$2x-3=0 \quad 2x+3=0$

$\frac{2x}{2} = \frac{3}{2}$

$x = \frac{3}{2}$

$2x = -3$
 $x = -\frac{3}{2}$

⑨ $x(x^2 - 5x + 6)$

$x(x-3)(x-2)$

$x=0 \quad x-3=0 \quad x-2=0$

$x=3 \quad x=2$



← Facts about that graph:

x-int: -3, -1, 2 y-int: 6

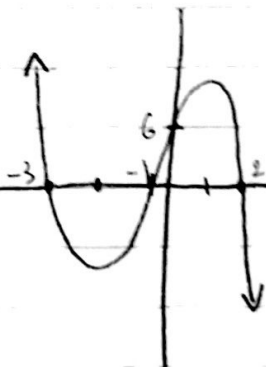
odd, negative

end behavior $x \rightarrow -\infty \quad f(x) \rightarrow \infty$

$x \rightarrow \infty \quad f(x) \rightarrow -\infty$

Continuous $d(-\infty, \infty)$

$y(-\infty, \infty)$



Function Notation: $f(-3)=0 \quad f(-1)=0 \quad f(2)=0 \quad f(0)=6$

Function: $f(x) = x^2 + 3x^2 - 4x - 12$ Factor $(x+3)$ Roots of Function