1.5
Notes

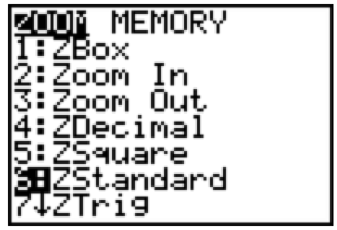
GRAPHS AND GRAPHING CALCULATOR

OBJECTIVES: 1) Use your graphing calculator to estimate x intercepts.

STANDARD VIEWING WINDOW:

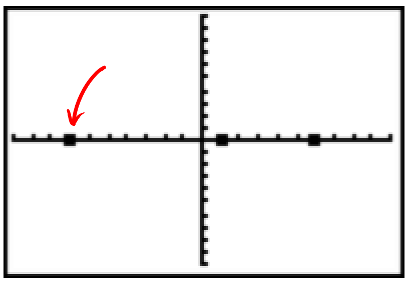
$[x_{\min}, x_{\max}, x_{scl}]$ by $[y_{\min}, y_{\max}, y_{scl}]$

$[-10, 10, 1]$ by $[-10, 10, 1]$

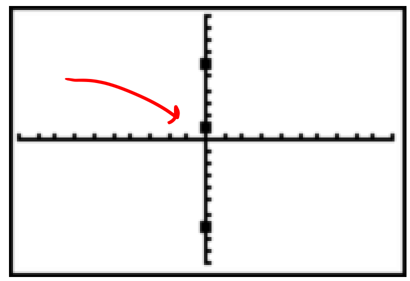


INTERCEPTS: EXACT (ALGEBRAIC) AND APPROXIMATE (CALCULATOR)

x-intercept
(#,0)
Root
Zero



y-intercept
(0,#)
Initial Value



1. Plot the function $y = 3x^3 - 2x^2$ in the given windows:
   a. standard. How many roots? ?! Hard to tell!
   b. $[-1, 1, .1]$ by $[-1, 1, .1]$. How many roots? 3 → verify algebraically:

$y = x^2(3x - 2)$ → or $x \cdot x(3x - 2) = 0$

$x = 0$ $x = 0$ $3x - 2 = 0$

$x^2 = 0$ $3x - 2 = 0$

$x = 0$ $x = 2/3$

Double root

roots: $0, 0, 2/3$

2. Find approximate and exact roots for $y = -2x^3 + 4x^2 + 4x$.

$y = -2x^3 + 4x^2 + 4x$

let $y = 0$; factor out GCF

$0 = -2x(\underbrace{x^2 - 2x - 2})$

$x = 0$ not factorable → use quad. form.

$x = \dfrac{2 \pm \sqrt{2^2 - 4(1)(-2}}{2}$

$= \dfrac{2 \pm \sqrt{12}}{2}$

$= 1 \pm \sqrt{3}$

$$\boxed{\begin{array}{cc} \multicolumn{2}{c}{\text{Roots:}} \\ \text{exact} & \text{approx.} \\ 0, 1 \pm \sqrt{3} & 0, 2.73, -.73 \end{array}}$$

3. Estimate (from graph) and find intercepts for $xy - x^2y + x^3 = 4$.

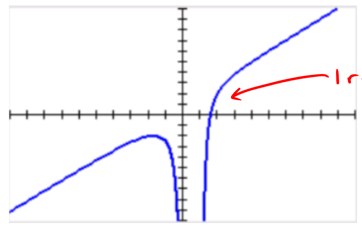
Solve for y to graph:

$$xy - x^2y = -x^3 + 4$$

$$xy(1-x) = -x^3 + 4$$

$$y = \frac{-x^3+4}{x(1-x)}$$

From graph:



1 real root

y intercept? check algebraically

Algebraically:

Find y int: let $x = 0$

$$y = \frac{-0^3+4}{0(1-0)}$$

$$y = \frac{4}{0}$$ undefined!

$\therefore$ y int doesn't exist, graph never crosses y-axis

Find x int: let $y = 0$, solve for x

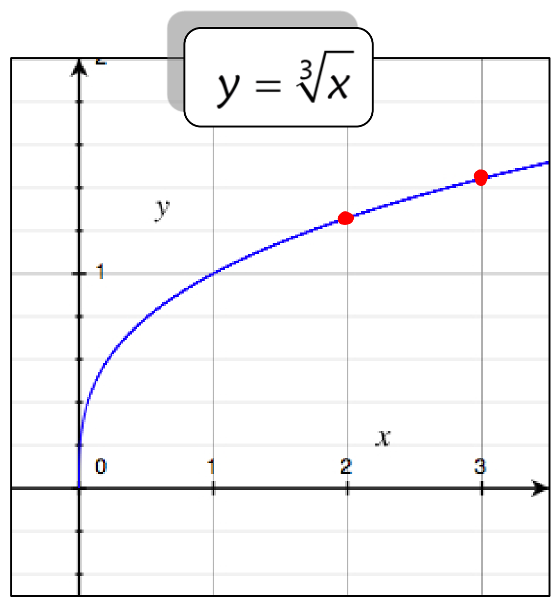
$$0 = \frac{-x^3+4}{x(1-x)} \Rightarrow 0 = -x^3 + 4$$

$$x^3 = 4$$

$$x = \sqrt[3]{4}$$

4. Use the graph to estimate each:

a. $\sqrt[3]{2}$ ≈ 1.259



b. $\sqrt[3]{3}$ ≈ 1.442

c. $\sqrt[3]{6}$ ≈ 1.817

eventhough it's not on the graph we know $\sqrt[3]{2}$ & $\sqrt[3]{3}$!

$$\sqrt[3]{2} \cdot \sqrt[3]{3} = \sqrt[3]{6}$$

$$(\approx 1.259)(\approx 1.442) \approx \boxed{1.81}$$