

Complete Graphs

Math 111

For each of the following functions, find a viewing rectangle that shows the important features of the graph. Find the domain and range, x and y intercepts, local maximum and minimum values, the basic shape and end behavior. These functions have been carefully selected so that you will have to use your knowledge of the graphical properties of lines, quadratics, and other functions to be successful. Good luck!¹

Example 1: $y = 0.002x + 436$

1st: List all important points with their coordinates: $(0, 436)$ $(-218000, 0)$

y -int: $(0, 436)$

x -int: Let $y = 0$

solve $0 = 0.002x + 436$

$\Rightarrow -436 = 0.002x$

$$\begin{aligned} x &= -\frac{436}{0.002} \\ &= -218000 \\ &(-218000, 0) \end{aligned}$$

2nd: To find the window you need:

-218000 (smallest x) 0 (largest x)

and the distance between the smallest and largest x : $\Delta x =$ 218000

10% is above
22000

0 (smallest y) 436 (largest y)

and the distance between the smallest and largest y : $\Delta y =$ 436

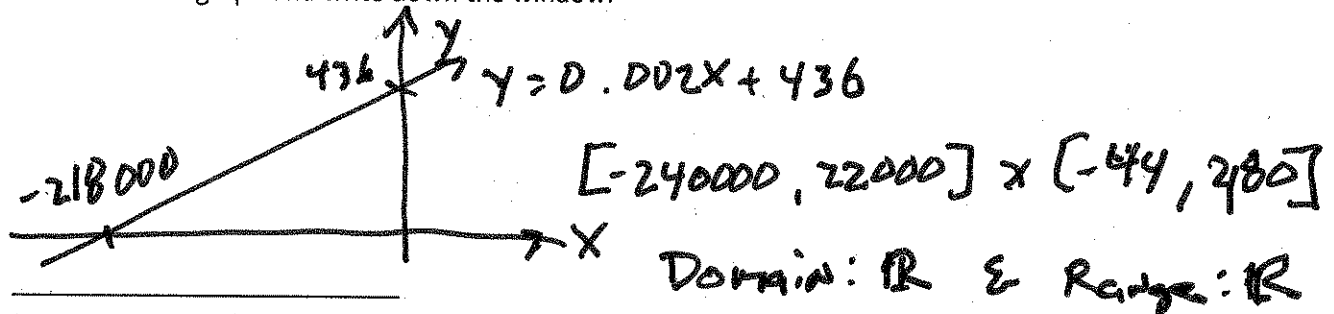
10% is above
44

3rd: Your window is:

$x_{\text{Min}} = \text{smallest } x - 0.1 \Delta x =$ -240000 and $x_{\text{Max}} = \text{largest } x + 0.1 \Delta x =$ 22000

$y_{\text{Min}} = \text{smallest } y - 0.1 \Delta y =$ -40 and $y_{\text{Max}} = \text{largest } y + 0.1 \Delta y =$ 476

4th: Sketch the graph and write down the window.

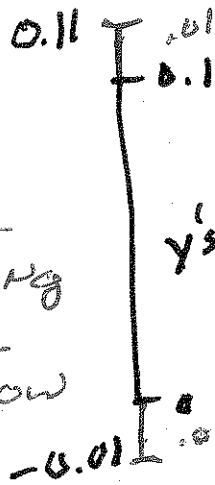


¹ Thanks to Sally Fischbeck (1994) and Stuart Moakowitz (2003) for these gems.

Example 2: $f(x) = \frac{3}{7}x + 0.1$

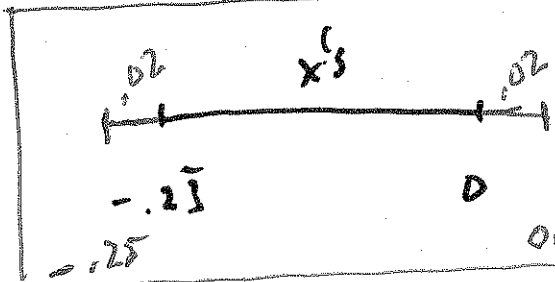
y-int: $(0, 0.1)$

x-int: $(-0.2\bar{3}, 0)$

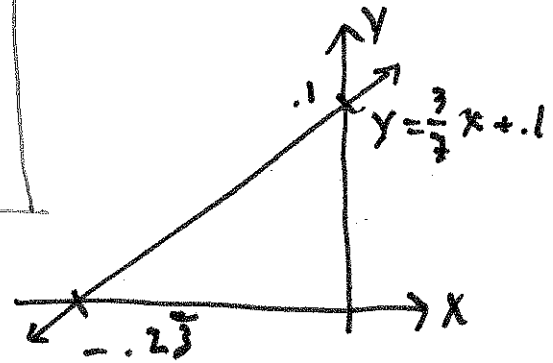


$[-0.25, 0.02]x$

$[-0.01, 0.11]$



Finding the window



Example 3: $g(x) = x^2 - 2x + 100$

Domain: \mathbb{R}

Range: \mathbb{R}

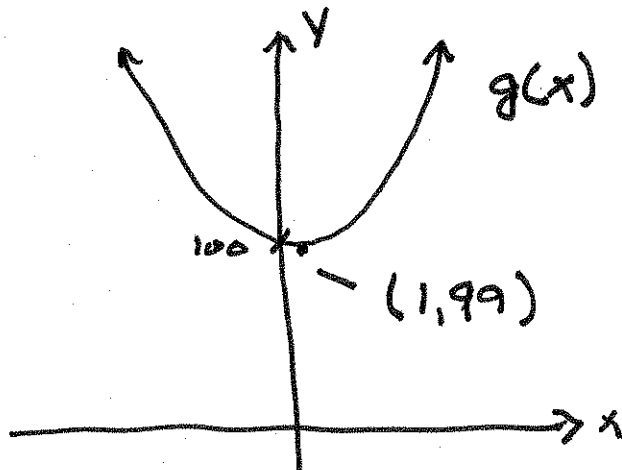
y-int: $(0, 100)$

$[-10, 10] \times [-10, 200]$

Domain: \mathbb{R}

Range: $[99, \infty)$

min: $(1, 99)$



Example 4: $y = |99 + 2x - x^2|$

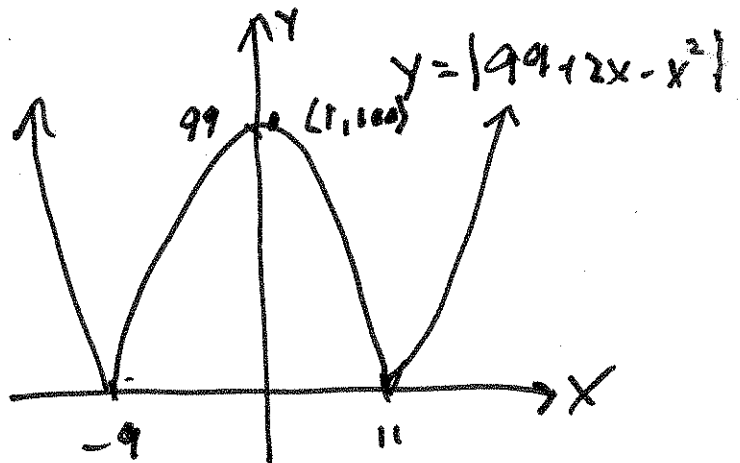
$[-21, 23] \times [-10, 120]$

y-int $(0, 99)$

max $(1, 100)$

min $(-9, 0)$

$(11, 0)$



Domain: \mathbb{R}

Range: $[0, \infty)$