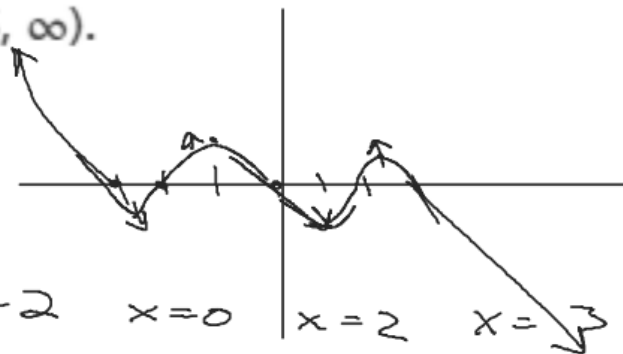


26. Use the information below to sketch a graph of the polynomial function $y = f(x)$. SEE EXAMPLE 4

- $f(x)$ is positive on the intervals $(-\infty, -3)$, $(-2, 0)$, and $(2, 3)$.
- $f(x)$ is negative on the intervals $(-3, -2)$, $(0, 2)$, and $(3, \infty)$.
- $f(x)$ is increasing on the interval $(-2.67, -1)$ and $(1, 2.5)$.
- $f(x)$ is decreasing on the intervals $(-\infty, -2.67)$, $(-1, 1)$, and $(2.5, \infty)$.



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

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

$$y = -a(x+3)(x+2)(x)(x-2)(x-3)$$

In science class, Abby mixes a fixed amount of baking soda with different amounts of vinegar in a bottle capped by a balloon. She records the amount of time it takes the gases produced by the reaction to inflate the balloon.

From her data, Abby created a function to model the situation.

For x quarter-cups of vinegar, it takes

$t(x) = -0.12x^3 + x^2 - 3.38x + 13.16$ seconds to inflate the balloon.

A. How long would it take to inflate the balloon with 5 quarter-cups of vinegar?

$$t(5) = -.12(5)^3 + 5^2 - 3.38(5) + 13.16$$

$$= 6.26 \text{ sec}$$

B. What do the x - and y -intercepts of the graph mean in this context? Do those values make sense?

y -intercept $(0, 13.16)$

If zero quarter cups of vinegar is added the balloon will inflate in 13.16 sec.

x -intercept

$$x = 6.585$$

If 6.585 quarter cups of vinegar is added the balloon will take 0 seconds to inflate.

5. Danielle is engineering a new brand of shoes. For x shoes sold, in thousands, a profit of $p(x) = -3x^4 + 4x^3 - 2x^2 + 5x + 10$ dollars, in ten thousands, will be earned.

a. How much will be earned in profit for selling 1,000 shoes?

$$(1000, 140,000)$$

b. What do the x - and y -intercepts of the graph mean in this context? Do those values make sense?

y -intercept

$$(0, 10)$$

If she sells zero

shoes she will make

$$\$100,000$$

x -in

$$(-.86, 0) \quad (1.91, 0)$$

