Math 112

$\text{Cost} = \boxed{\$49{,}820 + 30.33x}$

Q's

A company that manufactures small canoes has a fixed cost of $49,820.00. It costs $30.33 to produce each canoe. The selling price is $44.64 per canoe. Let x represent the number of canoes produced and sold.

a) Write the cost function, $C(x)$, for this company.

Answer:

b) Write the revenue function, $R(x)$, for this company.

$\text{Revenue} = \boxed{\$44.64x}$

Answer:

c) How many canoes must be produced and sold to break even?

Note: Round your answer up and include the appropriate units.

$\Rightarrow \text{Rev} = \text{Cost}$

$\text{Profit} = 0$

Answer:

cost/item

$\text{Cost} = \text{fixed} + (\quad)(\text{items})$

" a specific \$ amount

$\text{Revenue} = (\quad)\text{items}$

Revenue/item

$\text{Profit} = \text{Revenue} - \text{Cost}$

Break Even

Rev. Cost

$$44.64x = 49820 + 30.33x$$
$$-30.33x \qquad -30.33x$$

$$14.31x = 49820$$

$$x = \frac{49820}{14.31} \approx 3481.48$$

$\boxed{3482}$

Biologists have noticed that the chirping of crickets of a certain species is related to temperature, and the relationship appears to be very nearly linear. A cricket produces 120 chirps per minute at 65 degrees Fahrenheit and 175 chirps per minute at 85 degrees Fahrenheit.

Find a linear equation that models the temperature T as a function of the number of chirps per minute N.

$T(N) =$ ______

If the crickets are chirping at 152 chirps per minute, estimate the temperature:

Temperature = ______

(temp, chirp)

$(65, 120)$

$(85, 175)$

temp chirp

$$m = \frac{175-120}{85-65} = \frac{55}{20} = \frac{11}{4} \frac{\text{chirp}}{\text{temp}}$$

$$\boxed{N - 120 = \frac{11}{4}(T - 65)}$$

?

$T = ?$

$$N - 120 = \frac{11}{4}T - \frac{11}{4}\cdot 65$$

$$N - 120 + \boxed{\frac{11}{4}\cdot 65} = \frac{11}{4}T$$

178.75

$$\frac{4}{11}\left(N + 58.75\right) = \frac{4}{11}\left(\frac{11}{4}T\right)$$

temp

$$\boxed{\frac{4}{11}N + \frac{235}{11} = T}$$

chirps

Ch 3 Polynomials

$$\boxed{f(x) = a_n x^n + \cdots + a_2 x^2 + a_1 x^1 + a_0}$$

① all $a_0, a_1, \ldots, a_n$ are real numbers (**Notation**: usually just say a_i)

② $n = 0$ or 1 or 2 or 3 ... (whole numbers)

③ $a_n \neq 0$

↑ why?

$p_1(x) = 3x + 1$

don't allow these

$p_2(x) = 0x^3 + 3x + 1$

$p_3(x) = \cancel{0}x^3 + 0x^2 + 3x + 1$

④ $a_n x^n$ is the leading term

(4a) $a_n \equiv$ leading coefficient

(4b) $n \equiv$ degree of the polynomial

⑤ $a_0 \equiv$ constant term

⑥ Domain $(-\infty, \infty)$

ex's

$$f(x) = 3x^4 + \underbrace{\boxed{2x^7}}_{\text{leading term}} - x^3 + 1$$

degree $= 7$

lead coeff $= 2$

(ex) $f(x) = -3x^{17} + 2x - 4$

leading term

lead coeff $= -3$

degree $= 17$

(ex) $f(x) = 3x - 4x^2 + 7x^3 - 8x^6$

leading term

lead coeff $= -8$

degree $= 6$

(ex) $f(x) = \boxed{2x^2 - 3x + 1 + 4x^{-1} - 3x^{-2}}$

Not a polynomial

(ex) $f(x) = x^3(x^2+1)(x^2-1)$

$= x^3(x^4 \cancel{-x^2} \cancel{+x^2} - 1)$

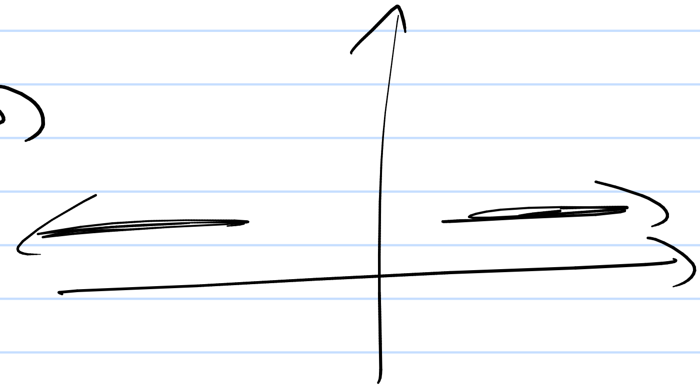
$= x^3(x^4 - 1)$

$= x^7 - x^3$

lead coeff $= 1$

degree $= 7$

Graphing



① Domain $(-\infty, \infty)$

all polynomials

have no corners

polynomials are continuous and smooth.

② **End Behavior** $\Rightarrow$ goes to $\quad x \to +\infty$

(ex) $f(x) = \boxed{x^2} + 2x - 1 = x^2\left(1 + \boxed{\frac{2}{x}} - \frac{1}{x^2}\right)$

Note: Factor a monomial

$$3x^3 + 2x^2$$

$$x^2(3x + 2)$$

$$3x^3 + 2x^2 + x^1 - 1$$

$$x^2(3x + 2 + x^{-1} - x^{-2})$$

$$(x^{1/2} - x^{-1/2})$$

$$x^{-1/2}(x - 1)$$

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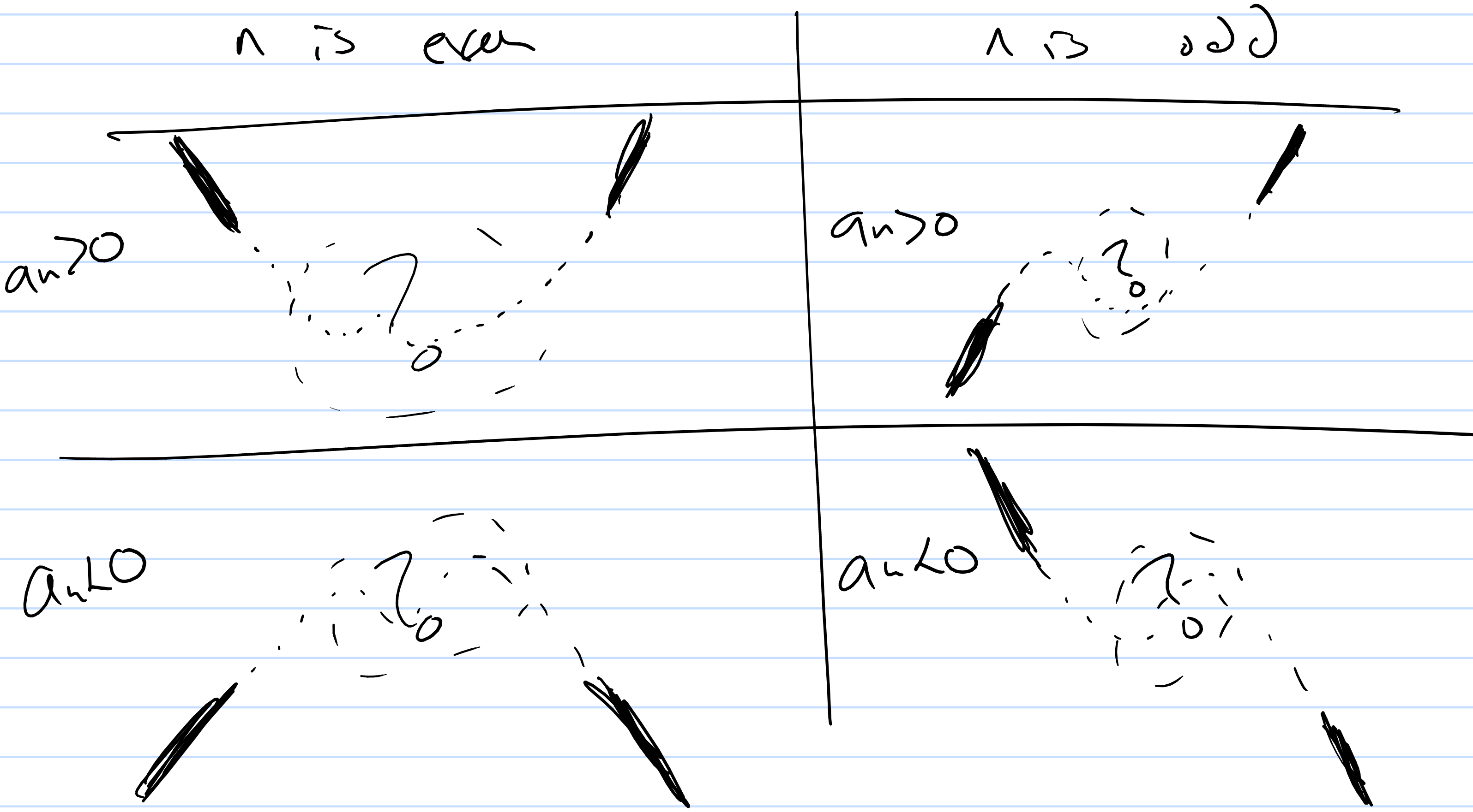
also $\quad \frac{1}{x^{-2}} = x^2 \qquad x^{-3} = \frac{1}{x^3}$

So $f(x) = a_nx^n + \cdots + a_2x^2 + a_1x + a_0$

end behaviors as $x \to \infty$
or $x \to -\infty$

are determined by a_nx^n



Middle?

Intercepts: y-axis $(0, a_0)$

x-axis

Solve $0 = a_nx^n + \cdots + a_2x^2 + a_1x + a_0$