

2.3 / More Functions

Note Title

2/20/2008

Until Now: Lines: $y = mx + b$

Parabolas: $y = a(x-h)^2 + k$

$$y = ax^2 + bx + c$$

① Power function

② Root function

③ Absolute Value Function

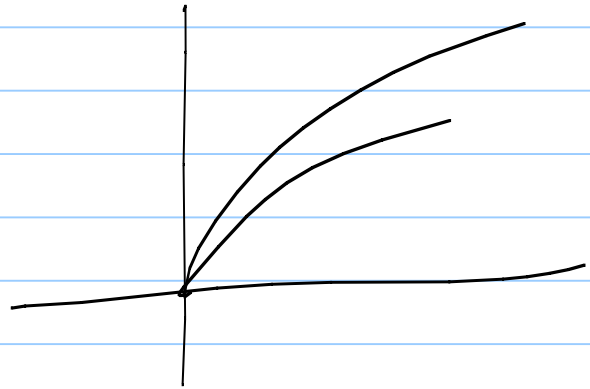
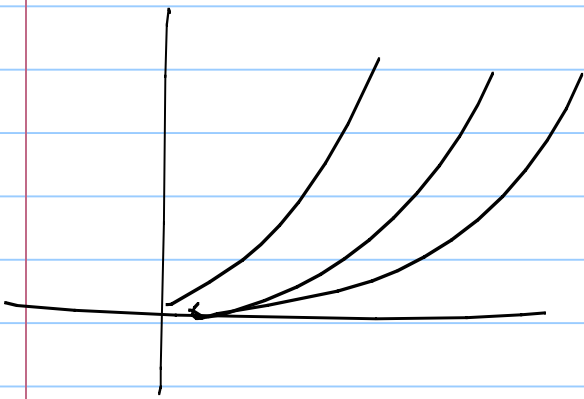
④ Piecewise Functions

① Power functions

$$f(x) = a x^n$$

$n \rightarrow$ power

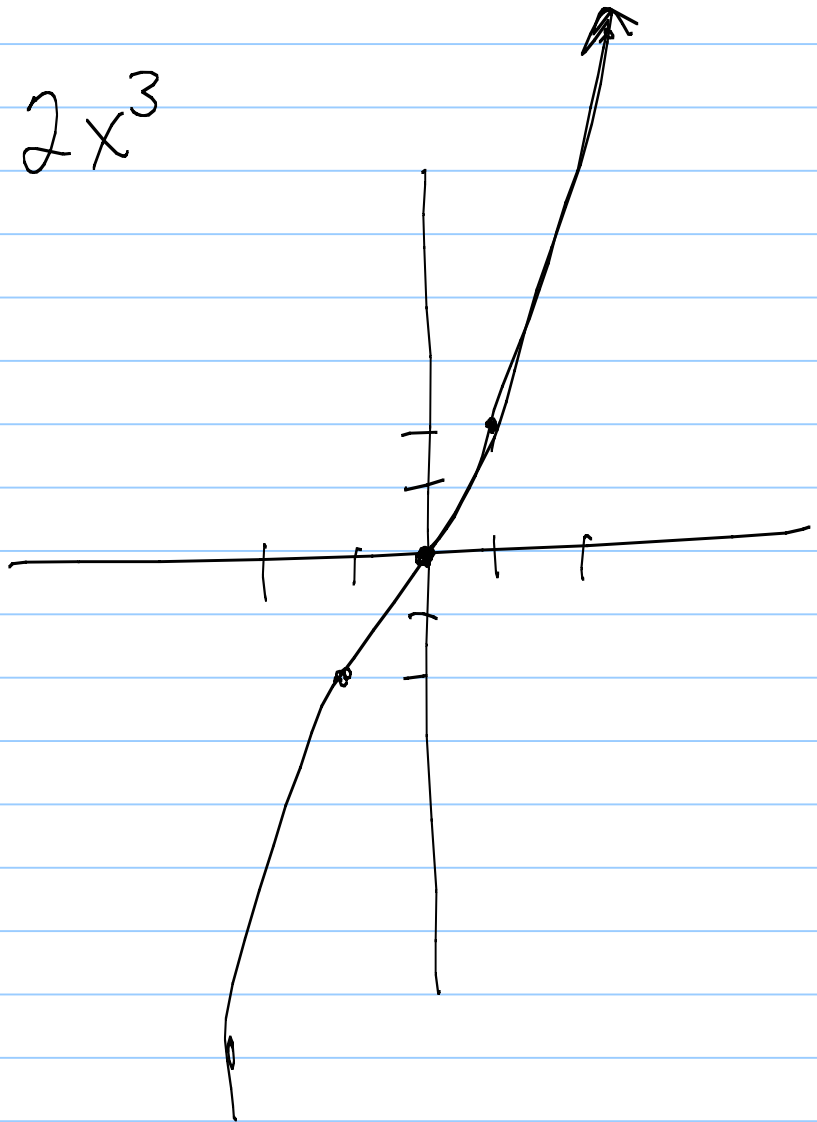
some
constant



Example of a Power Function

$$f(x) = 2x^3$$

x	f(x)
-2	-16
-1	-2
0	0
1	2
2	16



Ex) Suppose a taxi company could model the # of taxi miles driven each day by the following function:

$$f(x) = 489x^{.6},$$

where x is the # of drivers employed per day

a) Find $f(32)$.

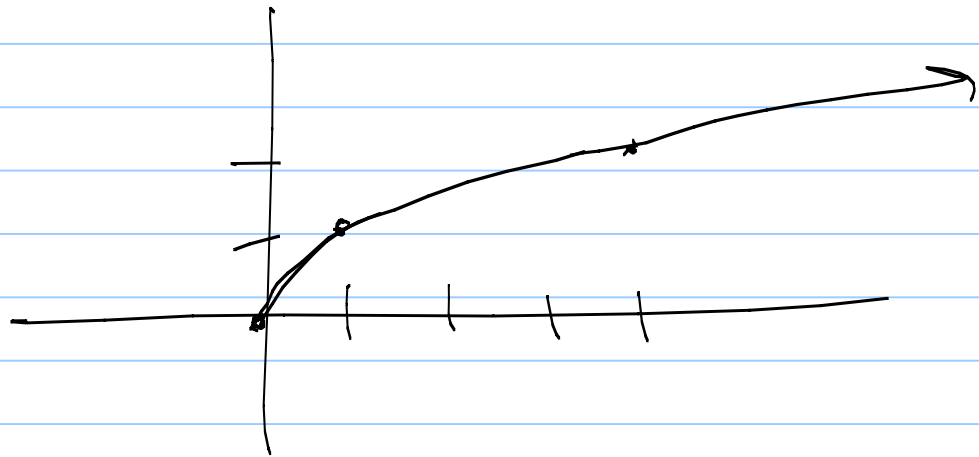
$$\begin{aligned} f(32) &= 489(32^{.6}) \\ &= 3,912 \text{ miles} \end{aligned}$$

When there are 32 taxi drivers on a given day, the total # of miles driven is 3,912.

② Root function (Also a power function)

a) $f(x) = x^{1/2} = \sqrt{x}$

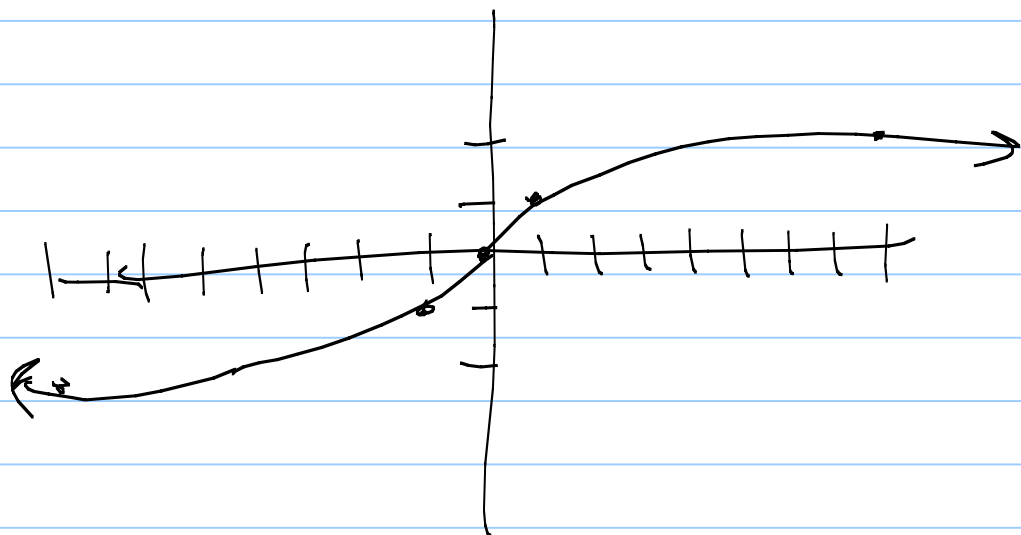
x	f(x)
0	0
1	1
4	2
9	3



Domain: $x \geq 0$

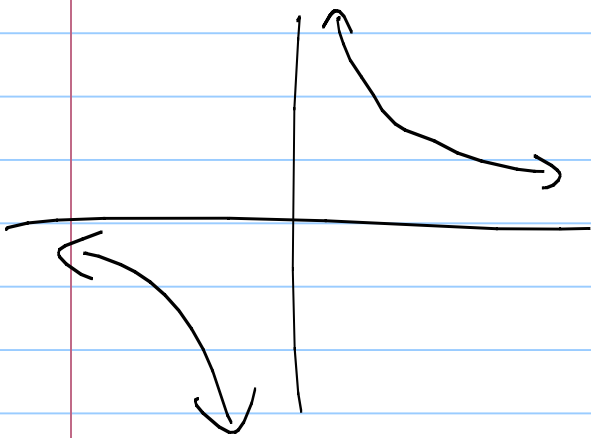
③ $f(x) = x^{1/3} = \sqrt[3]{x}$ ←

x	f(x)
-8	-2
-1	-1
0	0
1	1
8	2



* What happens if the power on x is negative?

$$f(x) = x^{-1} = \frac{1}{x}$$



the

Example: Average Cost of making photo album is given by the function $A(x) = 4.5 + \frac{1000}{x}$, where x is the # of albums produced.

If 500 albums are produced, what is the avg. cost per album?

(Find $A(500)$).

$$A(500) = \$6.50$$

A few comments on exponents . . .

① What is $x^m \cdot x^n$?

$$\begin{aligned}x^3 \cdot x^5 &= (x \cdot x \cdot x)(x \cdot x \cdot x \cdot x \cdot x) \\ &= x^{3+5} = x^8\end{aligned}$$

$$x^m \cdot x^n = x^{m+n}$$

② What about $(x^m)^n$?

$$\begin{aligned}(x^2)^3 &= x^2 \cdot x^2 \cdot x^2 \\ &= x^6\end{aligned}$$

$$x^{mn} = (x^m)^n$$

③ What is X^0 ?

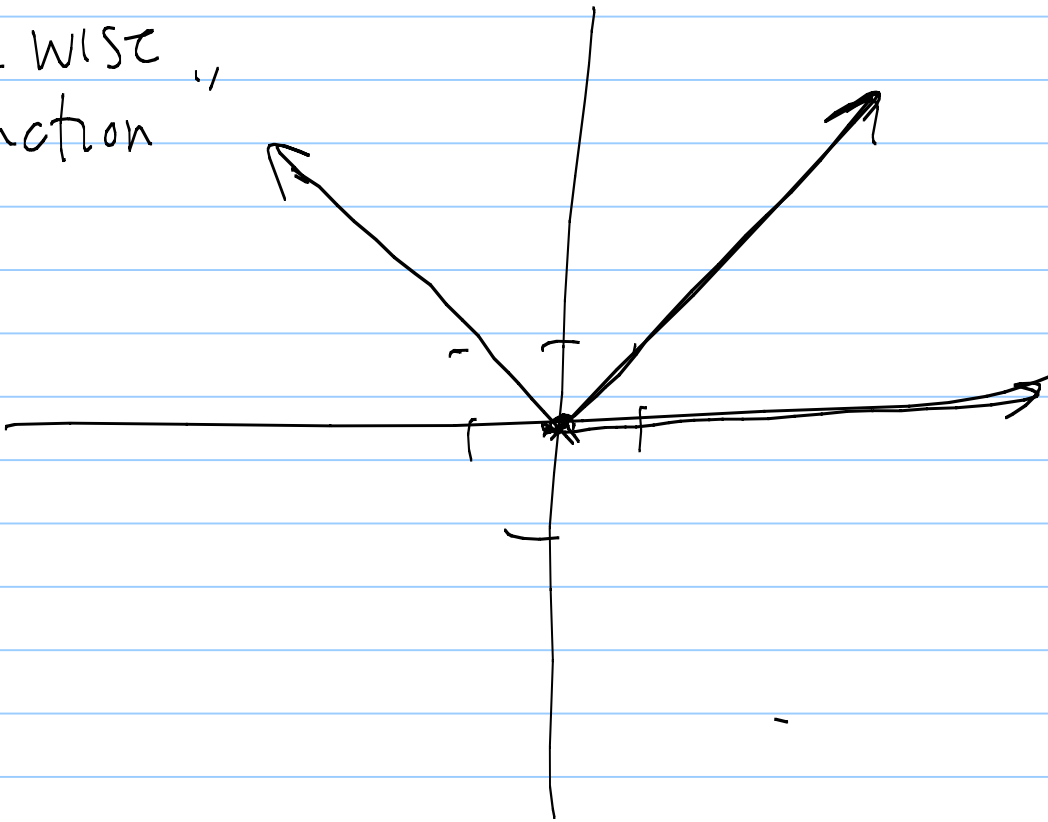
$$\underline{\underline{X^0}} \cdot X^n = X^{0+n} = \underline{\underline{X^n}}$$

$$X^0 = 1$$

③ Absolute Value Function

$$f(x) = \begin{cases} x, & x \geq 0 \\ -x, & x < 0 \end{cases}$$

"piecewise",
function



Electricity Example: Find a cost function, $C(x)$, (defined piecewise) that gives monthly cost of electricity based on x ^{kWh} hours of usage.

$$C(x) = \begin{cases} 10 + .02x, & \{ 0 \leq x \leq 100 \\ 15 + .03(x - 100), & \{ 100 < x \leq 500 \\ 20 + .04(x - 500), & \{ 500 < x \leq 1000 \end{cases}$$

What is $C(700)$?

$$\approx 20 + .04(700 - 500)$$

$$= 20 + .04(200)$$

$$= \$28$$

