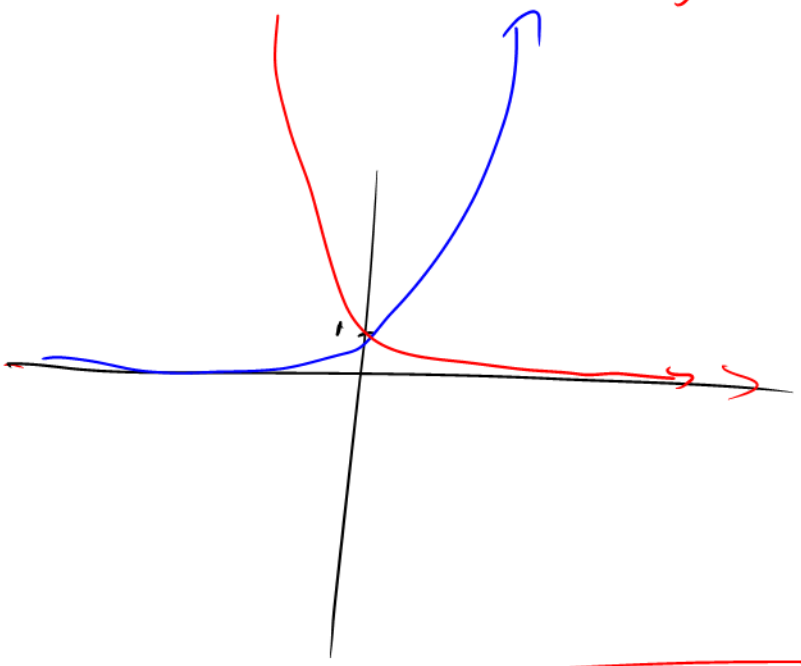
4.7 Applications Involving Exponential Functions

Exponential Function: $f(x) = ab^x$

b → base



$f(x) = 2^x$ – doubles

$f(x) = \left(\frac{1}{2}\right)^x$ – half life

$f(x) = ab^x$ $\quad x \rightarrow$ # of periods or the time.

- $f(x)$ → final amount
- a → initial amount
- $b = 1 + r$ for a growth
- $b = 1 - r$ for a decay

r = rate.

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ex: a population of 500^{a} frogs grows at a rate of 3% per year. $r = 0.03$ How many frogs are there in 6^{x} years?

$f(x) = 500(1+0.03)^x$

$f(x) = 500(1.03)^x$

$f(6) = 500(1.03)^6$

$f(6) = 597.03$

A car depreciates at a rate of 12% per year. (decay) $r = 0.12$

If you bought a car for $\$22\,000$: ($a$)

a) How much is the car worth in 2 years?

$f(x) = 22000(1-0.12)^x$

$f(x) = 22000(0.88)^x$

$f(2) = 22000(0.88)^2$

$f(2) = \$17036.80$

b) 50 months? = 4 years 2 months $\neq$ 4.2

$\frac{50}{12} = 4.17$

$f(4.17) = 22000(0.88)^{4.17}$

$f(4.17) = \$12909.68$

c) You want to sell the car when it is "worth" $\$5000$. When will you sell it?

$\frac{5000}{22000} = \frac{22000(0.88)^x}{22000}$ (÷ 22000)

$0.22727\ldots = 0.88^x$

Estimate! Pick an x and check it.

$x = 7$, 0.408

$x = 10$, 0.2785

$x = 11$, 0.245

$x = 12$, 0.215

∴ You would sell sometime in the 11th and 12th year.

Hw: pg 261 #1-4