4.7 Applications Involving Exponential Fcn

First the setup:

$f(x) = ab^x$

x ← # of periods → time

$f(x)$ ↓ outcome

a ↑ initial value

b → growth

$b = 1 + r$

r → rate

decay

$b = 1 - r$

A population of 320 frogs grows at a rate of 4.5% a year. How many frogs will there be in 15 years?

$a = 320$

$b = 1 + 0.045$

$b = 1.045$

$x = 15$

$$f(x) = ab^x$$

$$f(15) = 320(1.045)^{15}$$

$$f(15) = 619.29$$

A new car depreciates 20% per year.

Steve bought a car for $26,000. a) How much is Steve's car worth in 3 years? b) When will his car be worth $4,000?

$f(x) = ab^x$ $b = 1 - 0.2 = 0.8$

$f(3) = 26000(0.8)^3$

$f(3) = \$13,312$

$4000 = 26000(0.8)^x$

Try $x = 6$, 6815

$x = 10$, 2791

$x = 8$, $4362

$x = 9$ 3489

A 200g radioactive sample has a half-life of 138 days.

How much will be left in 5 years?

a

b

→ $365 \times 5 = 1825$

$$f(x) = ab^x$$

$$f(x) = 200\left(\frac{1}{2}\right)^{\frac{x}{138}}$$

$$f(1825) = 200\left(\frac{1}{2}\right)^{\frac{1825}{138}}$$

$$f(1825) \approx 0.21$$