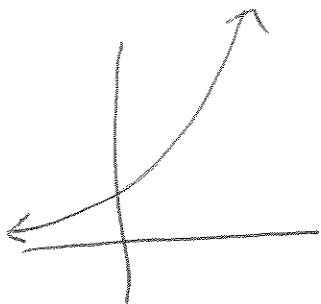


3.5 Exponential & Logarithmic Models

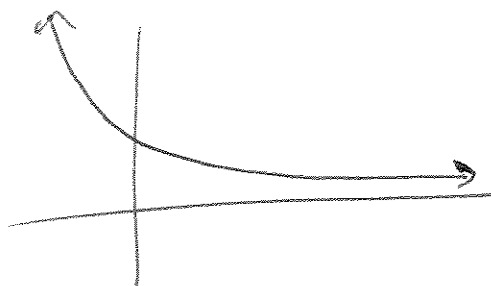
Exponential Growth

$$y = ae^{bx} \quad b > 0, a \in \mathbb{R}$$



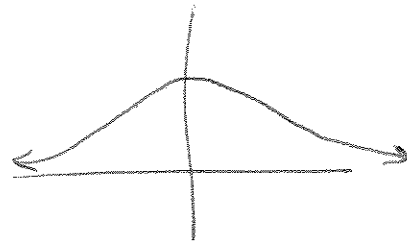
Exponential Decay

$$y = ae^{-bx} \quad b > 0, a \in \mathbb{R}$$



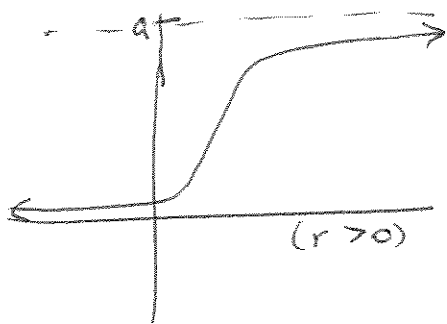
Gaussian

$$y = a e^{-\frac{(x-b)^2}{c}}$$



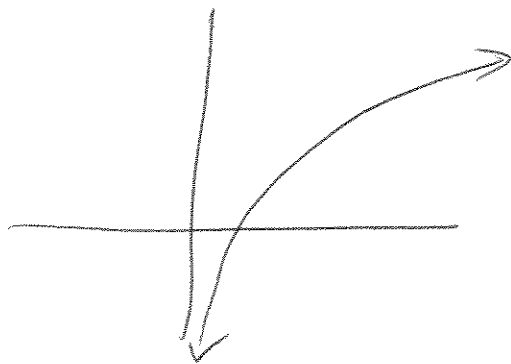
Logistic Growth

$$y = \frac{a}{1 + be^{-rx}}$$



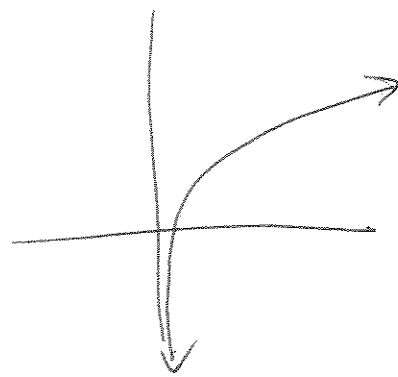
Logarithmic

$$y = a + b \ln x$$



Logarithmic

$$y = a + b \log x$$



Ex 1 Determine the principal (P) that must be invested at a rate of 12%, compounded monthly, so that \$500,000 will be available for retirement in 40 years.

3.5 (cont)

Ex 2 Radioactive iodine has a half-life of 60 days. Suppose a nuclear accident occurs and gives off an initial amount C of radioactive iodine.

(a) write an equation for the amount of radioactive iodine present at any time t following the accident.

(b) How long will it take for the radioactive iodine to decay to a level of 20% of the original amt?

3.5 (cont)

Ex 3 (#43) A 2005 Jeep Wrangler that costs \$30,788 now has a book value of \$18,000 after 2 years.

(a) Find a linear model $V = mt + b$.

(b) Find the exponential model $V = ae^{kt}$.

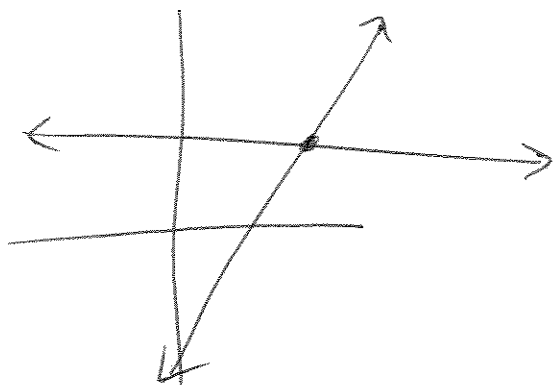
(c) Graph both models. Which model depreciates faster in first 2 years?

(d) Find book values after 1 year & 3 years.

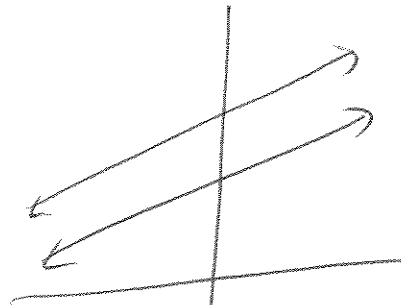
7.1 Linear and Nonlinear Systems of Eqns

A system of eqns is simply more than one eqn (w/ 2 or more variables) that we solve simultaneously.

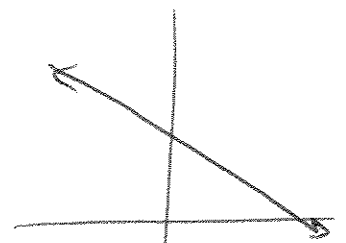
Remember a system of linear eqns in 2 variables had the following possibilities:



one solution
(intersection pt)



no solution
(parallel lines)



∞ solutions
(same lines)

Solving Strategies

- ① Graphing (not very reliable, but helpful)
- ② Substitution (the method that will always work)

7.1 (cont)

Ex 1 Solve using substitution.

(a) $x - y = -4$
 $x + 2y = 5$

(b) $3x + y = 2$
 $x^3 - 2 + y = 0$

7.1 (cont)

Ex 2 Solve by graphing.

$$2x - y + 3 = 0$$

$$x^2 + y^2 - 4x = 0$$

Ex 3 Solve.

$$y = (x+1)^3$$

$$y = \sqrt{x-1}$$

7.1 (cont)

Ex 4 Solve

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

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