

### Homework 31: 11.1 differential equations

- (1) 11.1 # 18, 24.
- (2) If  $dy/dx = \sin x$  and  $y(\pi) = 2$ , find the general solution and the particular solution. Draw the family of solutions and show the particular solution on the plot.
- (3) (a) Show that

$$P = \frac{1}{1 + e^{-t}}$$

satisfies the *logistic equation*  $dP/dt = P(1 - P)$ .

- (b) What is the limiting value of  $P$  as  $t \rightarrow \infty$ ?
- (4) Problem #2 from a previous edition of the textbook:
2. Match the graphs in Figure 11.4 with the following descriptions.
- (a) The population of a new species introduced onto a tropical island
  - (b) The temperature of a metal ingot placed in a furnace and then removed
  - (c) The speed of a car traveling at uniform speed and then braking uniformly
  - (d) The mass of carbon-14 in a historical specimen
  - (e) The concentration of tree pollen in the air over the course of a year.

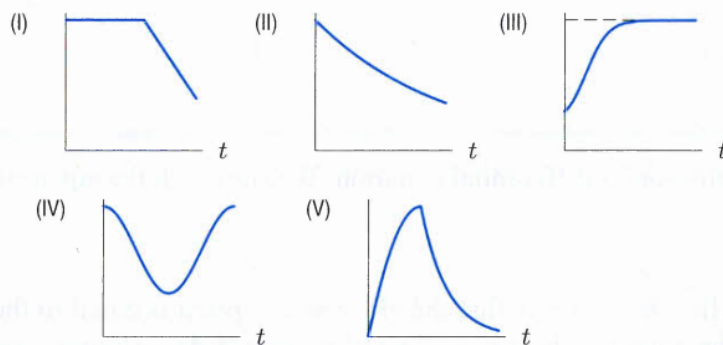


Figure 11.4