

## Assignment 553

In Exercises 41–56, find the derivative of the function.

41.  $f(x) = 4^x$

43.  $y = 5^{x-2}$

45.  $g(t) = t^2 2^t$

47.  $h(\theta) = 2^{-\theta} \cos \pi\theta$

49.  $y = \log_3 x$

51.  $f(x) = \log_2 \frac{x^2}{x-1}$

53.  $y = \log_5 \sqrt{x^2 - 1}$

55.  $g(t) = \frac{10 \log_4 t}{t}$

57.  $y = x^{2/x}$

58.  $y = x^{x-1}$

92. **Population Growth** A lake is stocked with 500 fish, and their population increases according to the logistics curve

$$p(t) = \frac{10,000}{1 + 19e^{-t/5}}$$

where  $t$  is measured in months.

- Use a graphing utility to graph the function.
- What is the limiting size of the fish population?
- At what rates is the fish population changing at the end of 1 month and at the end of 10 months?
- After how many months is the population increasing most rapidly?

**In Exercises 61–68, find or evaluate the integral.**

61.  $\int 3^x dx$

63.  $\int_{-1}^2 2^x dx$

65.  $\int x(5^{-x^2}) dx$

67.  $\int \frac{3^{2x}}{1 + 3^{2x}} dx$