Find the derivative of the function.

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

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

42. $g(\alpha) = 5^{-\alpha/2} \sin 2\alpha$

48. $f(t) = t^{3/2} \log_2 \sqrt{t+1}$

Find the equation of the tangent line to the graph of the function at the given point.

50. $y = 5^{x-2}$ $(2,1)$

51. $y = \log_3 x$ $(27,3)$

Use logarithmic differentiation to find dy/dx.

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

55. $y = (x-2)^{x+1}$

Find an equation of the tangent line to the graph of the function at the given point.

57. $y = x^{\sin x}$ $\left(\dfrac{\pi}{2}, \dfrac{\pi}{2}\right)$

60. $y = x^{1/x}$ $(1,1)$

Find the integral.

63. $\int x\left(5^{-x^2}\right) dx$

66. $\int 2^{\sin x} \cos x\, dx$

Evaluate the integral.

68. $\displaystyle\int_{-2}^{2} 4^{x/2} dx$

69. $\displaystyle\int_{0}^{1} \left(5^x - 3^x\right) dx$

70. Compound Interest

   a) How large a deposit , at 7% interest compounded continuously, must be made to obtain a balance of $10000 in 15 years?
   b) A deposit earns interest at a rate of r percent compounded continuously and doubles in value in 10 years. Find r.

91. The yield V (in millions of cubic feet per acres) for a stand of timber at age t is $V = 6.7e^{(-48.1)/t}$ where t is measured in years.

   a) Find the limiting volume of wood per acre as t approaches infinity.

   b) Find the rates at which the yield is changing when t=20 years and t=60 years.