Replacement Problems 142–148

142–16 $\int \frac{1}{x^2 + x}\,dx$

144–21 $\int \frac{dx}{4x^2 + 9}$

145–14 Use Euler's method, with 4 iterations, to approximate the value of y when x = 3.4 given the initial condition y = –2 when x = 3, and the differential equation $\frac{dy}{dx} = x^2 + y^2$.

145–16 (to be done after # 20)
Find the area of the region that is inside the graph of r = 3, and inside the graph of $r = 2 + 2\sin\theta$.

146–20 change the existing problem to:
. . . the value of y when x = 3 . . . $\frac{dy}{dx} = xy$

147–16 The number of bacteria was found to be proportional to the number of bacteria present, and to 5,000,000 minus the number of bacteria present. Find an equation that expresses the number of bacteria present as a function of time, if originally there were 500 bacteria and 10 hours later there were 50,000 bacteria.

148–17 According to the data in replacement problem 147–16, how many bacteria will there be after 15 hours? When will there be 4,000,000 bacteria?