

Solve each equation by using an appropriate method.

1.  $\frac{dy}{dx} = \sec^2 x \sec^3 y$
2.  $(x + y)dx + x dy = 0$
3.  $(\cos x \cos y - \cot x)dx - \sin x \sin y dy = 0$
4.  $2(2xy + 4y - 3)dx + (x + 2)^2 dy = 0$
5.  $y(2 - 3xy)dx - x dy = 0$
6.  $2y(x + y + 2)dx + (y^2 - x^2 - 4x - 1)dy = 0$
7.  $4(3x + y - 2)dx - (3x + y)dy = 0, \quad x = 1, y = 0$
8.  $(2x + 3y - 5)dx + (3x - y - 2)dy = 0$
9.  $xy dx + (y^4 - 3x^2)dy = 0$
10.  $\left[ x \exp\left(\frac{y^2}{x^2}\right) - y \right] dx + x dy = 0, \quad x = 1, y = 2$  (Hint: Use power series.)
11.  $(x + y - 4)dx - (3x - y - 4)dy = 0, \quad x = 4, y = 1$
12.  $(2y^3 - x^3)dx + 3xy^2 dy = 0, \quad x = 1, y = 1$
13.  $2xyy' = y^2 - 2x^3, \quad x = 1, y = 2$
14.  $y(2x - y + 1)dx + x(3x - 4y + 3)dy = 0$
15.  $y' \tan x \sin 2y = \sin^2 x + \cos^2 y$
16.  $x^4 y' = -x^3 y - \csc(xy)$
17.  $y \ln x \ln y dx + dy = 0$
18.  $y(x^2 + y^2)dx + x(3x^2 - 5y^2)dy, \quad x = 2, y = 1$
19.  $(xy^2 + x - 2y + 3)dx + x^2 y dy = 2(x + y)dy, \quad x = 1, y = 1$
20.  $(y - \sin^2 x)dx + \sin x dy = 0$