

## Partial Derivatives

Find  $f_{xx}$ ,  $f_{xy}$ ,  $f_{yx}$ ,  $f_{yy}$

1.  $f(x, y) = x^2y + xy^2$

2.  $f(x, y) = \frac{y + \tan(y)}{e^x}$

3.  $f(x, y) = \ln(xy)$

4.  $f(x, y) = \cos(x) \sin(y)$

Find the indicated partial derivative

5.  $f(x, y) = x \cos(xy)$ ;  $f_x(3, \pi)$

6.  $f(x, y) = x^2\sqrt{x+y}$ ;  $f_y(2, 7)$

7.  $f(x, y) = \sin(y^3)$ ;  $f_x(2, 1)$

8.  $f(x, y) = x^y$ ;  $f_y(3, 2)$

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Use Implicit Differentiation to find  $\partial z/\partial x$  and  $\partial z/\partial y$

10.  $x^2 + y^2 = \sin(yz)$

11.  $xe^y = zy$

12.  $z + x = xyz$

13.  $4x - \sin(z) = y^2z$

## Tangent Planes

Find an equation of the tangent plane to the given surface at the specified point

14.  $z = y^2 + 3x^2, (1, 2, 7)$

15.  $z = \sin(x) \cos(y), (\pi, \pi, 0)$

16.  $z = xe^y, (1, 0, 1)$

17.  $z = \sqrt{y} \ln(x), (e, 4, 2)$

## Anti-Derivatives (Not covered in class yet)

Find  $f$  given the partial derivatives.

18.  $f_x(x, y) = -\frac{y}{2\sqrt{x^3}} + \frac{1}{2\sqrt{x}}; f_y(x, y) = \frac{1}{\sqrt{x}} + 1$

19.  $f_x(x, y) = y \cos(xy) + \sin(y); f_y(x, y) = (x + 1) \cos y + x \cos(xy)$

20.  $f_x(x, y) = \frac{1}{x} - \frac{1}{x^2y}; f_y = -\frac{2}{y^3} - \frac{1}{xy^2}$

21.  $f_x(x, y) = \sin^2(y); f_y(x, y) = (x + 1) \sin(2y)$