

# 14.7 Second-Order Partial Derivative

Name:

Date:

**P 12.** Find the quadratic Taylor polynomials about  $(0, 0)$  for  $(y - 1)(x + 1)^2$ .

**P 15.** Find the quadratic Taylor polynomials about  $(0, 0)$  for  $e^x \cos y$ .

**P 27.** Use the level curves of the function  $z = f(x, y)$  to decide the sign (positive, negative, or zero) of each of the following partial derivatives at the point  $P$ . Assume the  $x$ - and  $y$ -axes are in the usual positions.

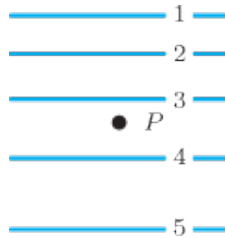
(a)  $f_x(P)$

(c)  $f_{xx}(P)$

(e)  $f_{xy}(P)$ .

(b)  $f_y(P)$

(d)  $f_{yy}(P)$



**P 30.** Use the level curves of the function  $z = f(x, y)$  to decide the sign (positive, negative, or zero) of each of the following partial derivatives at the point  $P$ . Assume the  $x$ - and  $y$ -axes are in the usual positions.

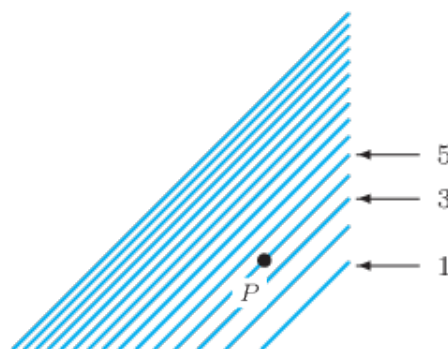
(a)  $f_x(P)$

(c)  $f_{xx}(P)$

(e)  $f_{xy}(P)$ .

(b)  $f_y(P)$

(d)  $f_{yy}(P)$



**P 46.** The table corresponds to the values of a quadratic polynomial  $P(x, y) = a + bx + cy + dx^2 + exy + fy^2$ . Determine whether the coefficients of  $d, e,$  and  $f$  of the quadratic terms is positive, negative, or zero.

|          |    | <b>x</b> |    |    |
|----------|----|----------|----|----|
|          |    | 10       | 12 | 14 |
| <b>y</b> | 10 | 26       | 36 | 54 |
|          | 15 | 31       | 41 | 59 |
|          | 20 | 36       | 46 | 64 |

**P 55.** You plan to buy a used car. You are debating between a 5-year old car and a 10-year old car and thinking about the price. Experts report that the original price matters more when buying a 5-year old car than a 10-year old car. This suggests that we model the average market price,  $P$ , in dollars as a function of two variables: the original price,  $C$ , in dollars, and the age of the car,  $A$ , in years.

(a) Give units for the following partial derivatives and say whether you think they are positive or negative. Explain your reasoning.

a  $\partial P/\partial A$

b  $\partial P/\partial C$

(b) Express the experts' report in terms of partial derivatives.

(c) Using a quadratic polynomial to model  $P$ , we have

$$P = a + bC + cA + dC^2 + eCA + fA^2.$$

Which term in this polynomial is most relevant to the experts' report?