Solution Week 9

8. Determine whether the partial derivatives $\partial f/\partial x$ and $\partial f/\partial y$ are positive or negative at the point P on the graph in Figure 7.
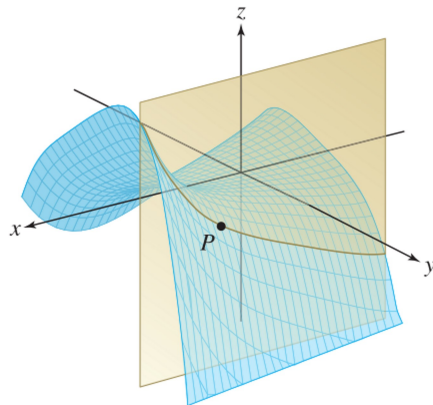

FIGURE 7

- at P walking in x-direction going up. so $f_x > 0$
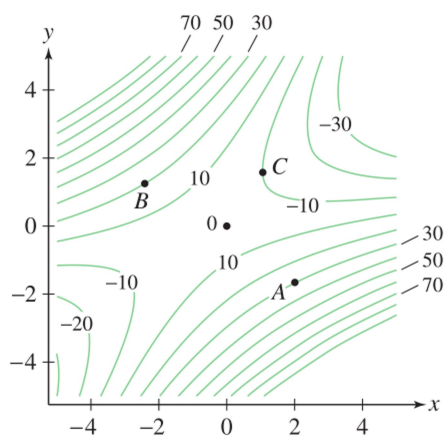
- " " " " y-direction " down so $f_y < 0$

FIGURE 8 Contour map of $f(x, y)$.

10. Is f_x positive or negative at B?

at B, going to the right goes down.

Hence $f_x < 0$

11. Starting at point B, in which compass direction (N, NE, SW, etc.) does f increase most rapidly?

12. At which of A, B, or C is f_y smallest?

11. NW

12. At A. since $f_y < 0$ here.

At C, $f_y = 0$ since tangent to level curve

At B, $f_y > 0$

21. $z = (\sin x)(\sin y)$

$$\frac{\partial z}{\partial x} = (\cos x)(\sin y)$$

$$\frac{\partial z}{\partial y} = (\sin x)(\cos y)$$

34. $z = y^x$

$$\frac{\partial z}{\partial y} = x y^{x-1}$$

$$\frac{\partial z}{\partial x} = \ln x \cdot y^x$$

38. $w = \dfrac{x}{y+z}$

$$\frac{\partial w}{\partial x} = \frac{1}{y+z}$$

$$\frac{\partial w}{\partial y} = \frac{-x}{(y+z)^2} = \frac{\partial w}{\partial z}$$