

### Check your understanding

33. Let  $F$  be a differentiable function and assume that  $F(x_0, y_0, z_0) = 0$  and  $\nabla F(x_0, y_0, z_0) \neq 0$ . Which of the following implies that the tangent plane to the surface  $F(x, y, z) = 0$  at  $(x_0, y_0, z_0)$  is vertical?
- (a)  $\nabla F(x_0, y_0, z_0)$  is a scalar multiple of  $\langle 0, 0, 1 \rangle$ .
  - (b) The  $z$  component of  $\nabla F(x_0, y_0, z_0)$  vanishes.
  - (c) Neither.

Answer: (b).

Explanation: Note that (a) implies that the tangent plane is horizontal.