Practicing partial differentiation

Practice Quiz, 5 questions

5/5 points (100.00%)

Congratulations! You passed!

Next Item

1/1 point

1. In this quiz, you will practice doing partial differentiation, and calculating the total derivative.

Given $f(x,y) = \pi x^3 + xy^2 + my^4$, with m a constant, what are $\frac{\partial f}{\partial x}$ and $\frac{\partial f}{\partial y}$?

- $\frac{\partial f}{\partial x} = 3\pi x^3 + y^2,$
  $\frac{\partial f}{\partial y} = 2xy^2 + 4my^4$
- (selected) $\frac{\partial f}{\partial x} = 3\pi x^2 + y^2,$
  $\frac{\partial f}{\partial y} = 2xy + 4my^3$

  Correct
  Well done!
- $\frac{\partial f}{\partial x} = 3\pi x^2 + y^2 + my^4,$
  $\frac{\partial f}{\partial y} = 3\pi x^2 + y^2 + my^4$
- $\frac{\partial f}{\partial x} = 3\pi x^3 + y^2 + my^4,$
  $\frac{\partial f}{\partial y} = \pi x^3 + 2xy + 4my^3$

1/1 point

2. Given $f(x,y,z) = x^2y + y^2z + z^2x$, what are $\frac{\partial f}{\partial x}$, $\frac{\partial f}{\partial y}$ and $\frac{\partial f}{\partial z}$?

- $\frac{\partial f}{\partial x} = xy + z^2,$
  $\frac{\partial f}{\partial y} = x^2 + yz$
  $\frac{\partial f}{\partial z} = y^2 + zx$
- $\frac{\partial f}{\partial x} = 2xy + y^2z + z^2x,$
  $\frac{\partial f}{\partial y} = x^2 + 2yz + z^2x$
  $\frac{\partial f}{\partial z} = x^2y + y^2 + 2zx$
- (selected) $\frac{\partial f}{\partial x} = 2xy + z^2,$
  $\frac{\partial f}{\partial y} = x^2 + 2yz$
  $\frac{\partial f}{\partial z} = y^2 + 2zx$

  Correct
  Well done!
- $\frac{\partial f}{\partial x} = 3xyz,$
  $\frac{\partial f}{\partial y} = 3xyz$
  $\frac{\partial f}{\partial z} = 3xyz$

1/1 point

3. Given $f(x,y,z) = e^{2x}sin(y)z^2 + cos(z)e^xe^y$, what are $\frac{\partial f}{\partial x}$, $\frac{\partial f}{\partial y}$ and $\frac{\partial f}{\partial z}$?

- (selected) $\frac{\partial f}{\partial x} = 2e^{2x}sin(y)z^2 + cos(z)e^xe^y,$
  $\frac{\partial f}{\partial y} = e^{2x}cos(y)z^2 + cos(z)e^xe^y$
  $\frac{\partial f}{\partial z} = 2e^{2x}sin(y)z - sin(z)e^xe^y$

  Correct
  Well done!
- $\frac{\partial f}{\partial x} = 4e^{2x}cos(y)z - sin(z)e^xe^y,$
  $\frac{\partial f}{\partial y} = 4e^{2x}cos(y)z - sin(z)e^xe^y$
  $\frac{\partial f}{\partial z} = 4e^{2x}cos(y)z - sin(z)e^xe^y$
- $\frac{\partial f}{\partial x} = 2e^{2x}sin(y)z^2 + cos(z)e^xe^y,$
  $\frac{\partial f}{\partial y} = e^{2x}cos(y)z^2 + cos(z)e^xe^y$
  $\frac{\partial f}{\partial z} = 2e^{2x}sin(y)z + sin(z)e^xe^y$
- $\frac{\partial f}{\partial x} = 2e^{2x}sin(y)z^2 + cos(z)e^y,$
  $\frac{\partial f}{\partial y} = e^{2x}cos(y)z^2 + cos(z)e^x$

$\frac{\partial f}{\partial z} = 2e^{2x}sin(y)z - sin(z)e^x e^y$

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4. Recall the formula for the total derivative, that is, for $f(x, y), x = x(t)$ and $y = y(t)$, one can calculate $\frac{df}{dt} = \frac{\partial f}{\partial x}\frac{dx}{dt} + \frac{\partial f}{\partial y}\frac{dy}{dt}$.

1 / 1 point

Given that $f(x, y) = \pi x^2 y, x(t) = t^2 + 1$, and $y(t) = t^2 - 1$, calculate the total derivative $\frac{df}{dt}$.

- (selected) $\frac{df}{dt} = 4\pi t(t^2+1)(t^2-1) + 2\pi t(t^2+1)^2$

  Correct
  Well done!

- $\frac{df}{dt} = 4\pi t(t^2+1)^2 + 2\pi t(t^2+1)^2$
- $\frac{df}{dt} = 2\pi(t^2+1)^2(t^2-1) + \pi(t^2+1)^2(t^2-1)$
- $\frac{df}{dt} = 8\pi^2 t^2(t^2+1)^3(t^2-1)$

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5. Recall the formula for the total derivative, that is, for $f(x, y, z), x = x(t), y = y(t)$ and $z = z(t)$, one can calculate $\frac{df}{dt} = \frac{\partial f}{\partial x}\frac{dx}{dt} + \frac{\partial f}{\partial y}\frac{dy}{dt} + \frac{\partial f}{\partial z}\frac{dz}{dt}$.

1 / 1 point

Given that $f(x, y, z) = cos(x)sin(y)e^{2z}, x(t) = t+1, y(t) = t-1, z(t) = t^2$, calculate the total derivative $\frac{df}{dt}$.

- (selected) $\frac{df}{dt} = [-sin(t+1)sin(t-1) + cos(t+1)cos(t-1) + 4tcos(t+1)sin(t-1)]e^{2t^2}$

  Correct
  Well done!

- $\frac{df}{dt} = [-sin(t+1)sin(t-1) + cos(t+1)cos(t-1) + 2cos(t+1)sin(t-1)]e^{2t^2}$
- $\frac{df}{dt} = [cos(t+1)sin(t-1) + cos(t+1)cos(t-1) + 4tcos(t+1)sin(t-1)]e^{2t^2}$
- $\frac{df}{dt} = [-(t+1)sin(t+1)sin(t-1) + (t-1)cos(t+1)cos(t-1) + 4tcos(t+1)sin(t-1)]e^{2t^2}$