1. In this quiz, you will practice doing partial differentiation, and calculating the total derivative. As you've seen in the videos, partial differentiation involves treating every parameter and variable that you aren't differentiating by as if it were a constant.

1 / 1 punto

Keep in mind that it might be faster to eliminate multiple choice options that can't be correct, rather than performing every calculation.

Given $f(x, y) = \pi x^3 + xy^2 + my^4$, with m some parameter, what are the partial derivatives of $f(x, y)$ with respect to x and y?

- ○ $\frac{\partial f}{\partial x} = 3\pi x^3 + y^2 + my^4$,

  $\frac{\partial f}{\partial y} = \pi x^3 + 2xy + 4my^3$

- ○ $\frac{\partial f}{\partial x} = 3\pi x^3 + y^2$,

  $\frac{\partial f}{\partial y} = 2xy^2 + 4my^4$

- ○ $\frac{\partial f}{\partial x} = 3\pi x^2 + y^2 + my^4$,

  $\frac{\partial f}{\partial y} = 3\pi x^2 + y^2 + my^4$

- ◉ $\frac{\partial f}{\partial x} = 3\pi x^2 + y^2$,

  $\frac{\partial f}{\partial y} = 2xy + 4my^3$

Correcto

Well done!

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 $\frac{\partial f}{\partial z}$?

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- ○ $\frac{\partial f}{\partial x} = 3xyz$,

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- ○ $\frac{\partial f}{\partial x} = xy + z^2,$

  $\frac{\partial f}{\partial y} = x^2 + yz$

  $\frac{\partial f}{\partial z} = y^2 + zx$

- ○ $\frac{\partial f}{\partial x} = 2xy + y^2z + z^2x,$

  $\frac{\partial f}{\partial y} = x^2 + 2yz + z^2x$

  $\frac{\partial f}{\partial z} = x^2y + y^2 + 2zx$

- ◉ $\frac{\partial f}{\partial x} = 2xy + z^2,$

  $\frac{\partial f}{\partial y} = x^2 + 2yz$

  $\frac{\partial f}{\partial z} = y^2 + 2zx$

Correcto
Well done!

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 $\frac{\partial f}{\partial z}$? **1 / 1 punto**

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

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

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

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

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

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

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

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

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

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

  $\frac{\partial f}{\partial y} = 4e^{2x}\cos(y)z - \sin(z)e^xe^y$

  $\frac{\partial f}{\partial z} = 4e^{2x}\cos(y)z - \sin(z)e^xe^y$

Correcto
Well done!

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 punto

Given that $f(x, y) = \frac{\sqrt{x}}{y}, x(t) = t$, and $y(t) = \sin(t)$, calculate the total derivative $\frac{df}{dt}$.

- ( ) $\frac{df}{dt} = \frac{1}{2\sqrt{t}\sin(t)} - \frac{\sqrt{t}}{\sin^2(t)}$
- (•) $\frac{df}{dt} = \frac{1}{2\sqrt{t}\sin(t)} - \frac{\sqrt{t}\cos(t)}{\sin^2(t)}$
- ( ) $\frac{df}{dt} = \frac{1}{2\sqrt{t}\sin(t)} + \frac{\sqrt{t}\cos(t)}{\sin(t)}$
- ( ) $\frac{df}{dt} = -\frac{1}{\sqrt{t}\sin(t)} - \frac{\sqrt{t}\cos(t)}{\sin^2(t)}$

Correcto
Well done!

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 $\frac{df}{dt} = \frac{\partial f}{\partial x}\frac{dx}{dt} + \frac{\partial f}{\partial y}\frac{dy}{dt} + \frac{\partial f}{\partial z}\frac{dz}{dt}$.

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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 $\frac{df}{dt}$.

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

Correcto
Well done!