Congratulations! You passed!

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1. About the Gradient Descent method, choose all that are true: **1 / 1 point**

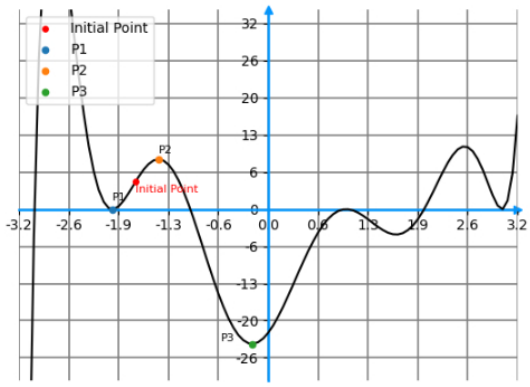
- [ ] It always converges to a local minimum.
- [x] The result may vary depending on the initial point.

Correct
You are correct! If the function has several minima, the initial point will dictate to where the algorithm will converge.

- [ ] If it converges, then it converges to a global minimum.
- [x] It only works for differentiable functions.

Correct
Correct! Since the Gradient Descent uses the Gradient as its base, and the gradient is related to partial derivatives, we must have differentiable functions to perform the algorithm.

2. Given the Initial Point on the following graph, to which point will the Gradient Descent method converge? **1 / 1 point**



- (•) P1.
- ( ) P2.
- ( ) P3.
- ( ) It won't converge.

Correct
You are correct! P1 is the point that the gradient descent will converge to!

3. Given that $f(x, y) = x^3y^2 + 3y^3$, find its derivative with respect to y, i.e., find $\frac{\partial f}{\partial y}$. **1 / 1 point**

Note: Please use * to indicate the product in the answer. So, if we wrote the entire function f as an answer, it would be x^3 * y^2 + 3 * y^3.

$2x^3y + 9y^2$

2*x^3*y + 9*y^2

Correct

4. Let $f(x, y) = 2x^2 + 3y^2 - 2xy - 10x$, the minimum value of $f(x, y)$ is **1 /**

- (•) -15
- ( ) 3
- ( ) 1

Correct
Correct!

5. What are the parameters that the Gradient Descent algorithm has? (check all that apply) **1 / 1 point**

- [x] Initial point

Correct
Correct! The gradient descent algorithm needs an initial point to start its path through the minimum.

- [ ] Final point
- [x] Learning rate

Correct
Correct! The learning rate is the size of each step.

- [x] Number of iterations

Correct
Correct! The number of iterations tells us how many times we will perform the calculations. Higher number of iterations will lead to more precise results but will take longer to perform the computations.

6. Let $f(x,y) = x^2 + y^2 - 6x$ and $\nabla f(x,y) = \begin{bmatrix} 2x - 6 \\ 2y \end{bmatrix}$ and let the initial point $x_0 = (0,1)$. **1 / 1 point**

Performing the gradient descent algorithm with learning rate = 0.1, the first iteration will lead us the point x_1 which is:

- (•) $x_1 = (0.6, 0.8)$
- ( ) $x_1 = (-6, 2)$
- ( ) $x_1 = (6, -1)$
- ( ) $x_1 = (0, 1)$

Correct
Correct!