

## 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.
- ☒ 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.

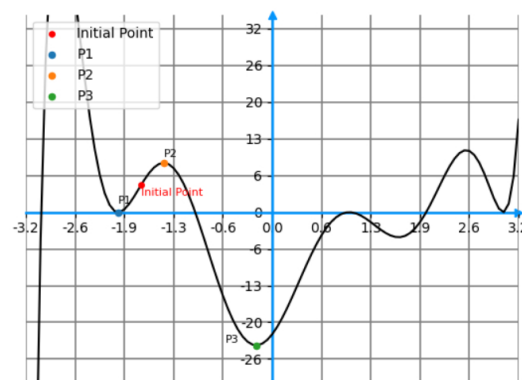
- ☐ If it converges, then it converges to a global minimum.
- ☒ It only works for differentiable functions.

✓ **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  $f(x, y)$  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 / 1 point

- ☒ -15

☐ 3

☐ 1



Correct

Correct!

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

0 / 1 point

☒ Initial point



Correct

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

☒ Final point



This should not be selected

Incorrect. The final point is the result of the gradient descent algorithm, if it converges.

☒ Learning rate



Correct

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

☐ Number of iterations

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!