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3. Constrained optimization concept check

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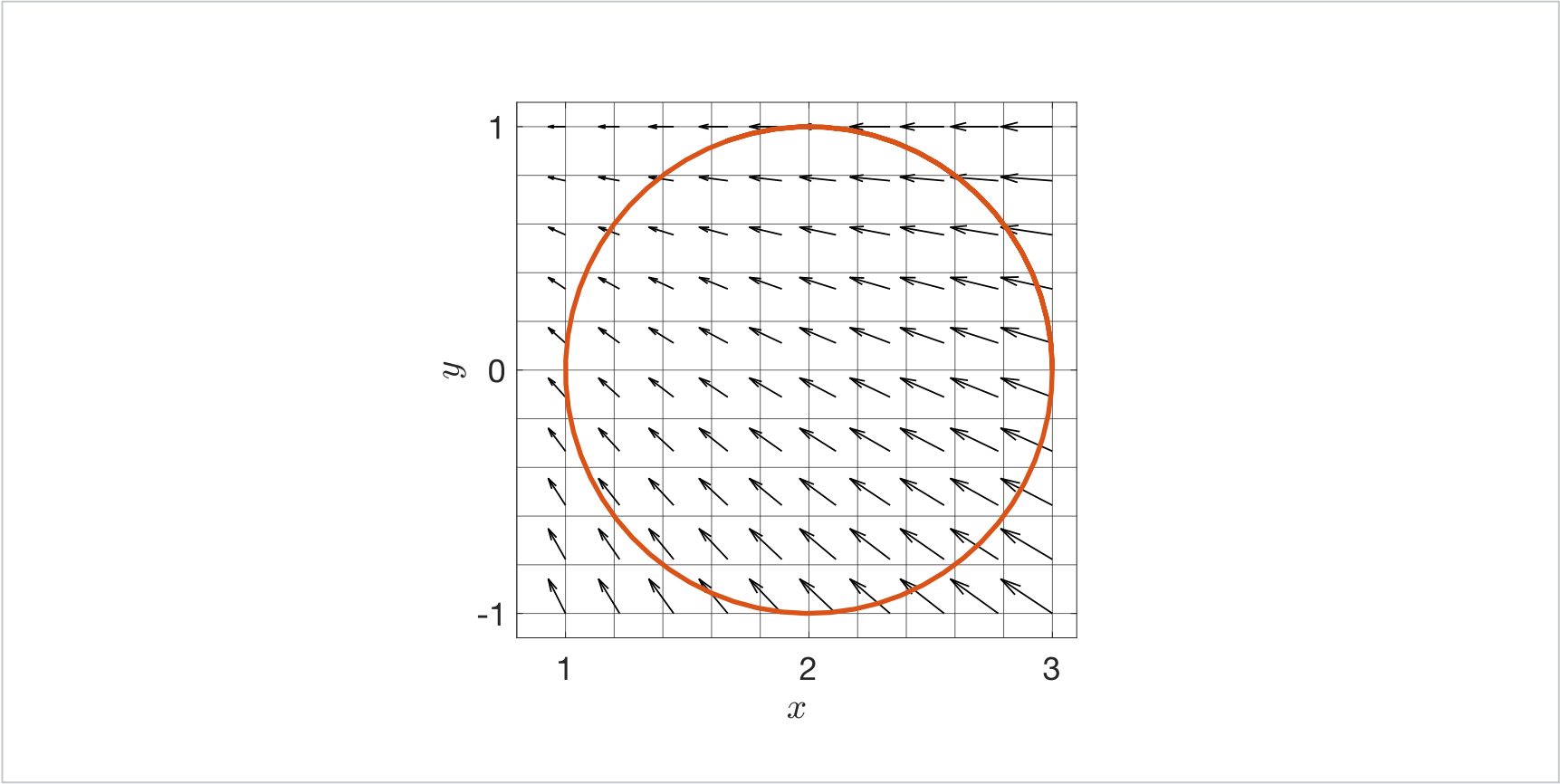


Review

Where is the maximum along the boundary?

1/1 point (graded)

Consider the gradient of the continuous function $f(x,y)$ inside the disk shown below.



Which of the following best approximates where the maximum of f occurs over the region?

- ☐ $(2.0, -1.0)$
- ☐ $(2.7, 0.3)$
- ☐ $(2.0, 1.0)$
- ☒ $(1.2, 0.6)$



Solution:

From the previous question, we know that the maximum occurs somewhere along the boundary. We also know that the gradient points in the direction of steepest increase of the function. So we want to choose the point that has arrows pointing roughly towards it along the boundary. Say we start at $(2, -1)$ and move clockwise around the disk. We are moving roughly with the arrows of the gradient, and so the function is increasing along the boundary at that point. If we continue this clockwise motion, we will get to approximately $(1.2, 0.6)$. Around this point, if we move clockwise, we start to move against the direction of the arrows. This means that the function starts to decrease. So the maximum must occur somewhere near $(1.2, 0.6)$.

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i Answers are displayed within the problem

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