

## Math 229 Quiz 11a

You may use only Julia or [math229.github.io](https://math229.github.io) – no other websites.

NAME: Solutions

**Problem 1.** Find the point  $(x, y)$  on the curve  $y = f(x)$  that is closest to  $(3, 4)$ .

$$f(x) = 10 - x^{5/2}.$$

Use `fzeros` to find all critical points of the distance function.

Classify the critical points using the first derivative test.

Compute  $(x, y)$  for the minimum critical  $x$ -value.

critical point  $(\underset{x}{2.06478}, \underset{y}{3.87391})$   
minimum

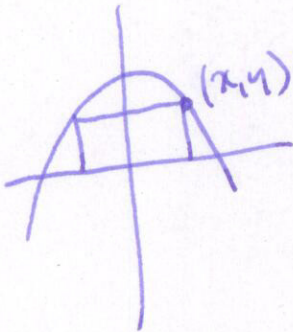
**Problem 2.** Find the area of the largest rectangle between  $y = f(x)$  and the  $x$ -axis.

$$f(x) = 16 - x^2.$$

Use `fzeros` to find all critical points of the area function.

Classify the critical points using the first derivative test.

Compute the area for the maximum critical  $x$ -value.



critical point  $(\underset{x}{2.30940}, \underset{A}{49.26722})$   
max.

## Math 229 Quiz 11b

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NAME: Solutions

**Problem 1.** Find the point  $(x, y)$  on the curve  $y = f(x)$  that is closest to  $(3, 4)$ .

$$f(x) = 12 - x^{5/2}.$$

Use `fzeros` to find all critical points of the distance function.

Classify the critical points using the first derivative test.

Compute  $(x, y)$  for the minimum critical  $x$ -value.

$$\min (2.30647, 1.92080)$$

x                      y

**Problem 2.** Find the area of the largest rectangle between  $y = f(x)$  and the  $x$ -axis.

$$f(x) = 18 - x^2.$$

Use `fzeros` to find all critical points of the area function.

Classify the critical points using the first derivative test.

Compute the area for the maximum critical  $x$ -value.

$$\max \left\{ \begin{array}{l} x = 2.44949 \\ A(x) = 58.78775 \end{array} \right.$$