Break-Ground:

A mysterious formula

Two young mathematicians discuss optimization from an abstract point of view.

Check out this dialogue between two calculus students:

Devyn: Riley, what do you think is the maximum value of

$$f(x) = \frac{10}{x^2 - 2.8x + 3}?$$

Riley: Where did that function come from?

Devyn: It's just some, um, random function.

Riley: Wait, does this have to do with coffee?

Devyn: Um, uh, no?

Riley: Well what interval are we on?

Devyn: Let's say $[0, 10]$, I mean there's no way I could possibly drink ten cups of coff...

Riley: I knew this was about coffee.

Here Devyn has made a function, that is supposed to record Devyn's "well-being" with respect to the number of cups of coffee consumed in one day.

Problem 1 *Graph Devyn's function. Where do you estimate the maximum on the interval $[0, 10]$ to be? The maximum is at $x =$* $\boxed{1.4}$

Problem 2 *If you wanted to argue that this is the (global) maximum value on $[0, 10]$ without plotting, what arguments could you use?*

Free Response:

Learning outcomes: Solve optimization problems by finding the appropriate extreme values.