

### Problem 1

1. Compute the limit  $\lim_{x \rightarrow \infty} \frac{\ln(x)}{x}$ .
2. Compute the limit  $\lim_{x \rightarrow \infty} x - \ln(x)$ . (Try to find a way to use part 1)

## Problem 2

Consider the function  $f(x) = x^4 + x^2 - x$ .

1. Show that the function has a critical point.
2. Show that the critical point of the function is unique.
3. Starting with  $x_0 = \frac{1}{2}$ , apply Newton's method to generate a better guess  $x_1$  for the critical point of the function.