

1. Use the l'Hospital rule to compute

$$\lim_{x \rightarrow 0} \frac{x \arctan x}{1 - \cos^2 x}.$$

2. Find intervals where is the function

$$f(x) = 3x - x^3.$$

concave and where it is convex. Determine also the coordinates of a point of inflexion.

3. Solve

$$\int \frac{x^2}{x+1} dx.$$

4. Find all solutions to

$$y'' + 4y' + 3y = 5.$$