Practice Problems

Let \( f(x) = x/(x^2 + 1) \).

1) (30 points) Differentiate and simplify.

2) (20 points) Find all points \( c \) where \( f'(c) = 0 \) or \( f'(c) \) does not exist. Find \( f(c) \).

5) (50 points) Use the first derivative test to find all local extremes. 6) (40 points) Find the second derivative of \( f \), and simplify.

7) (20 points) Find all points \( c \) where \( f''(c) = 0 \) or does not exist. Find \( f(c) \).

8) (30 points) Find concavity.

9) (10 points) Graph \( f \), plotting the information above.

Next Topic

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1) An isosceles triangle has two sides which are equal, and a base. The sides that are equal I call \( s \) and \( s \); the base I call \( b \). The area of such a triangle is \( \frac{1}{4} b \sqrt{4s^2 - b^2} \).

If the perimeter of the triangle is 3 inches; what lengths should \( s \) and \( b \) have, so that the area of the triangle is a maximum?

2) A rancher wants build a rectangular fence to keep emu inside. The fence has an outside, and two additional fences inside, one parallel to the length, and one parallel to the width. (This makes four pens inside the big fence). If the rancher has 600 ft of fence, what length and width should the fence be, to maximize the total area inside?

3) A box has a square base and top. It has a volume of 1000 \( ft^3 \). What dimensions minimize the surface area?