

Spring 2008: Extra Credit (use of CAS)

Due: March 20

1. If $f(x) = \frac{x^3 - 2}{x^4 - 1}$
 - a) Graph $f(x)$
 - b) Zoom in to approximate the coordinate of absolute maximum and minimum points.
 - c) Find $f'(x)$ and solve the equation $f'(x) = 0$, to check the result in part (a)
2. If $f(x) = x^4 - 5 \cos x$
 - a) Graph $f(x)$ and find the intervals of increasing and decreasing
 - b) Find $f'(x)$ & $f''(x)$ and interval of concavity change
 - c) Graph both $f'(x)$ & $f''(x)$
3. In the following functions find the critical points and intervals of increasing and decreasing:
 - a) $f(x) = x^2 + 2 \sin x$
 - b) $f(x) = \sqrt{x^4 + 1} - \sqrt{x^2 + 1}$
 - c) $f(x) = \frac{x}{x^2 - \sin x + 1}$
4. Graph $f(x) = \frac{1}{3}x^3 - \frac{1}{400}x$ over $[-5, 5]$ and Find the critical points of $f(x)$
5. Find the asymptotes in the following functions:
 - a) $\frac{2x^3 + x^2 - 15x + 7}{(2x - 1)(3x^2 + x - 1)}$
 - b) $\frac{x^3 - 8}{x^2 + 1}$
6. Find the coordinates of the point on the curve $y = \sin x$ that is closest to the point $(1, 0)$
7. Suppose that the number of individuals at time t in a certain wildlife population is given by $N(t) = \frac{340}{1 + 9(0.77)^t}$ $t > 0$ where t is in years. At what instant of time is the size of the population increasing most rapidly?