

Week - In - Review Nov. 5: Sections 5.1 - 5.3

1. Find all critical values for the following functions:

(a) $f(x) = xe^{2x}$

(b) $f(x) = |x^2 - 4x|$

(c) $f(x) = \sqrt[3]{x} (8 - x)$

2. Find absolute extrema for the following functions:

(a) $f(x) = x^3 - 2x^2 + x - 5$ on $[-1, 3]$.

(b) $f(x) = x^{\frac{5}{3}} + 5x^{\frac{2}{3}}$ on $[-1, 4]$.

(c) $f(x) = \frac{1}{x-1}$ on (i) $[0, 2]$ and (ii) $[1, 2]$

3. Find the intervals where the function is increasing or decreasing and identify all local extrema.

(a) $f(x) = \frac{x}{(x-1)^2}$

(b) $f(x) = x\sin x + \cos x$ on $[0, 2\pi]$.

4. Determine the intervals where the given function is concave up or concave down and identify all inflection points.

(a) $f(x) = 5x^7 - 7x^6 + 10$

(b) $f(x) = x \ln(x - 2)$

5. Find the value of c in the interval $[1, 4]$ that satisfies the conclusion of the Mean Value Theorem for $f(x) = x^3 + 5$.

6. Find any oblique asymptotes for $f(x) = \frac{x^2}{x+1}$.

7. Find all asymptotes for $f(x) = \frac{3x^2 - x + 1}{x - 3}$

8. Put it all together and sketch a graph of $f(x) = xe^{-x}$.