

Calculus I -Worksheet # 9

Name:

ID #:

Section #:

1. Let $f(x) = x^4 - 2x^2 + 5$.

(a) Determine the intervals on which $f(x)$ is increasing and the intervals on which it is decreasing, then find the local maxima and minima of $f(x)$.

(b) Find the intervals on which $f(x)$ is concave upwards and the intervals on which it is concave downwards, then find the inflection points of $f(x)$.

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2. Let $f(x) = e^{x^2-3x}$.

(a) Find the intervals on which $f(x)$ is increasing and the intervals on which it is decreasing.

(b) Find the intervals on which $f(x)$ is concave upwards and the intervals on which it is concave downwards.

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3. Sketch a graph of a function $f(x)$ which satisfies the following:

$$f'(x) > 0 \text{ if } |x| < 2, \quad f'(x) < 0 \text{ if } |x| > 2$$

$$f'(2) = 0, \quad \lim_{x \rightarrow \infty} f(x) = 1$$

$$f(-x) = -f(x) \text{ for all } x$$

$$f''(x) < 0 \text{ if } 0 < x < 3 \text{ and } f''(x) > 0 \text{ if } x > 3$$

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4. Let $f(x) = \frac{x}{x^2-9}$. Given that $f'(x) = -\frac{x^2+9}{(x^2-9)^2}$ and $f''(x) = \frac{2x(x^2+27)}{(x^2-9)^3}$. Sketch the graph of $f(x)$.
(Find the domain, asymptotes, intervals of increasing and decreasing, concavity intervals, inflection points ...)