



Department of Mathematical Sciences

قسم علوم الرياضي

Calculus I -Worksheet # 9

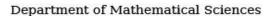
Name: ID #: Section #:

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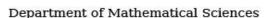
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3. Sketch a graph of a function f(x) which satisfies the following:

$$\begin{array}{l} f'(x)>0 \ \ \text{if} \ |x|<2, \qquad f'(x)<0 \ \ \text{if} \ |x|>2 \\ f'(2)=0, \qquad \lim_{x\to\infty}f(x)=1 \\ f(-x)=-f(x) \ \textit{for all } x \\ f''(x)<0 \ \ \text{if} \ 0< x<3 \ \ \text{and} \ \ f''(x)>0 \ \ \text{if} \ x>3 \end{array}$$







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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 ...)