

Feng Chia University 111-1 Class Purdue I Calculus HW5

(Time : 60 minutes. Pages: Two Pages, Total 100 points)

Name : _____ SID : _____

A 、Filling blanks :

(A)	(B)	(C)
(D)	(E)	(F)
(G)	(H)	(I)
(J)	(K)	(L)

- Find the critical number(s) of $f(x) = 2x^3 - 15x^2 + 24x - 5$ is(are) $x = \underline{\text{(A)}}$.
- Find the critical number(s) of $f(x) = x^{\frac{2}{3}}(x - 3)$ is(are) $\underline{\text{(B)}}$.
- Find all values of c that satisfies the Rolle's theorem for the function $f(x) = x^4 - 2x^2$ on the interval $(-2, 2)$ is(are) $c = \underline{\text{(C)}}$.
- Find the interval of increasing of function $f(x) = \frac{6-x}{\sqrt{x}}$ is $\underline{\text{(D)}}$.
- Find the interval of concave downward of the function $f(x) = e^{-\frac{x^2}{2}}$ is $\underline{\text{(E)}}$.
- Find the relative maximum of $f(x) = \frac{x}{2} - \sin x$ in the interval $(0, 2\pi)$ is $\underline{\text{(F)}}$.
- Find the point(s) of inflection of $f(x) = x^3 - \frac{3}{2}x^2$ is(are) $(x,y) = \underline{\text{(G)}}$.
- Find the limit, $\lim_{x \rightarrow \infty} \frac{e^{2x}}{x^3} = \underline{\text{(H)}}$.
- Find the limit, $\lim_{x \rightarrow 1} \frac{\ln x}{x-1} = \underline{\text{(I)}}$.
- Find the limit, $\lim_{x \rightarrow 1} \left(\frac{1}{x-1} - \frac{1}{\ln x} \right) = \underline{\text{(J)}}$.
- Find the limit, $\lim_{x \rightarrow 0} (1+x)^{\frac{1}{x}} = \underline{\text{(K)}}$.
- Find the limit, $\lim_{x \rightarrow \infty} x^{\left(\frac{1}{x}\right)} = \underline{\text{(L)}}$.

B 、 Computations : (Total 60%, Show all your work, NO DETAIL WORK, NO POINTS!!)

1. (8%) Find the absolute extrema of $f(x) = 3x^4 - 4x^3$ on the interval $[-1, 2]$.

2. (8%) Find all values of c that satisfies the Mean Value theorem for the function $f(x) = x^3 + 2x$ on the interval $[-1, 1]$

3. (8%) By the second derivative test, find the relative extrema of $f(x) = \frac{x}{x^2+1}$.

4. (20%) Given $f(x) = x^3 - 9x^2 + 24x - 18$, (a) Find all critical number(s). (b) Find the interval of increasing or decreasing. (c) Find the relative extrema of $f(x)$. (d) Find the interval of concave upward or downward. (e) Find all point(s) of inflection.