

ASSIGNMENT 413-6

To be returned 10.30.03

Main Part.

- 1 (3+3+4). a. Plot the graph of $f(x) = \sin \frac{1}{x}$, $x > 0$
b. Plot the graph of $f(x) = \begin{cases} x \sin \frac{1}{x}, & x \neq 0 \\ f(0) = 0 \end{cases}$
c. 5.1.3.6.

2 (5). Find the limit positions of all the secant lines of the graph of $f(x)$ from Problem 1b passing through 0. A line l through zero is a limit position of secant lines of a graph $y = f(x)$, $f(0) = 0$, provided that there exists a sequence $x_n \rightarrow 0$ such that the secant lines passing through 0 and $(x_n, f(x_n))$ tend to l .

3 (15). 5.1.3.9

Comment. A "zoom" of the graph in the problem is a graph of a function g such that $f(x_0 + x/M) = y_0 + g(x)/M$.

4 (5). 5.2.4.2 (the domain of f is an interval)

5 (5). 5.2.4.11

6 (5). 5.3.4.7

7 (5). 5.3.4.8

Supplementary part.

8 (10). Prove that if $f^{(n)} \equiv 0$ then f is a polynomial

9 (15). 5.3.4.3