

(1) Using L'Hospital rule, find the following limits.

a. $\lim_{x \rightarrow 0} \frac{1 - \cos 2x}{x + x^2}$

b. $\lim_{x \rightarrow 0} \frac{\tan x - x}{x - \sin x}$

c. $\lim_{x \rightarrow \pi} \frac{\sin 3x}{\tan 5x}$

d. $\lim_{x \rightarrow 1} \left(\frac{2}{x^2 - 1} - \frac{1}{x - 1} \right)$

e. $\lim_{x \rightarrow 0} x \cdot \cot 2x$

f. $\lim_{x \rightarrow a} \frac{x^m - a^m}{x^n - a^n} \quad a \in \mathbb{R}; m, n \in \mathbb{N}^*$

(2) Use Newton's method to estimate the one real solution of $x^3 + 3x + 1 = 0$, Start with $x_0 = 0$ and then find x_3 .

(3) Use Newton's method to find the two negative roots of $f(x) = x^3 - 3x - 1$ to five decimal places

(4) Finding Indefinite Integrals.

a. $\int \left(\frac{x^2}{2} + x \right) dx$

d. $\int -\frac{5 \sec^2 x}{3} dx$

b. $\int x^{-\frac{1}{4}} dx$

e. $\int \frac{2}{5} \sec x \cdot \tan x dx$

c. $\int 2x \cdot (1 - x^{-3}) dx$

f. $\int (1 + \tan^2 x) dx$

