Term Test A Material Covered

Functions find the domain and range of a function

Limits use properties of limits to find the limit of a function

Basic Differentiation use basic differentiation rules to find derivatives

Product and Quotient Rule use product and quotient rules to find derivatives

Trigonometric Differentiation know the derivatives of $\sin x, \cos x, \tan x$,$\arcsin x, \arctan x$

Chain Rule use chain rule to find derivatives; know the derivatives of $e^x, \ln x$

Higher Order Derivatives find higher order derivatives; find derivatives of functions with absolute values

Applications of Derivatives know exponential growth formula; know Newton's Law of Cooling; solve word problems in physics and economics; solve exponential growth problems; solve radiocarbon dating problems

Term Test A Practice Questions

(1) Find the limits for the following expressions.

$$\lim_{x\to 0} \sqrt{x^3 - x} \tag{1}$$

$$\lim_{x\to -\frac{5}{2}} \frac{2x+5}{5x+2} \tag{2}$$

$$\lim_{x\to 1} \frac{2x+3}{x^2+x-2} \tag{3}$$

$$\lim_{x\to 1} \frac{\sqrt{x^2-x}}{x-x^2} \tag{4}$$

(2) Find the derivative of the following functions.

$$f(x) = \frac{3}{4}\sqrt{2-x}, \text{ using the definition of derivatives} \tag{5}$$

$$f(x) = \frac{6}{x^3} + \frac{2}{x^2} - 2 \tag{6}$$

$$f(x) = \frac{3}{x + \sqrt{x}} \tag{7}$$

$$f(x) = \frac{x}{2x + \frac{1}{3x+1}} \tag{8}$$

$$h(r) = \sqrt{4r + \frac{3}{r^2+1}} \tag{9}$$

$$f(x) = \left(\sqrt{x} + \frac{1}{1+\sqrt{x^2+2}}\right)^2 \tag{10}$$

$$f(\vartheta) = \sqrt{\cos 2\vartheta} \tag{11}$$

$$G(t) = \sin\sqrt{|t|} \tag{12}$$

$$f(x) = (1-x)^2 \cos\frac{1}{x} \tag{13}$$

$$f(x) = \ln\ln x \tag{14}$$

$$f(x) = \frac{e^x - e^{-x}}{e^x + e^{-x}} \tag{15}$$

(3) Find the equation of the tangent line for the following functions and points.

$$f(x) = \frac{2}{3-4\sqrt{x}}, P = (1, ?) \tag{16}$$

$$v(t) = \frac{1+\sqrt{t}}{1-\sqrt{t}}, P = (?, -3) \tag{17}$$

$$f(x) = \sqrt{1+2x^2}, P = (2, ?) \tag{18}$$

$$f(x) = e^{2x}, P = (2, ?) \tag{19}$$

(4) Find the second derivatives for the following functions.

$$f(x) = x^{\frac{1}{3}} - x^{-\frac{1}{3}} \tag{20}$$

$$f(x) = (x^2+3)\sqrt{x} \tag{21}$$

(5) A radioactive substance decays at a rate proportional to the amount present. If 30 percent of such a substance decays in 15 years, what is the half-life of the substance?

(6) If a body in a room warms up from $5°C$ to $10°C$ in 4 minutes, and if the room is being maintained at $20°C$, how much longer will the body take to warm up to $15°C$?