AP CALCULUS PROBLEM SET 2 DERIVATIVES II

(89-4)

1. Let f be the function given by $f(x) = \dfrac{x}{\sqrt{x^2 - 4}}$

(a) Find the domain of f.

(b) Write an equation for each vertical asymptote to the graph of f.

(c) Write an equation for each horizontal asymptote to the graph of f.

(d) Find $f'(x)$.

(87-2)

2. Let $f(x) = \sqrt{1 - \sin x}$.

(a) What is the domain of f?

(b) Find $f'(x)$.

(c) What is the domain of f' ?

(d) Write an equation for the line tangent to the graph of f at $x = 0$.

(74-1)

3. Given $f(x) = |\sin x|$, $-\pi \le x \le \pi$, and $g(x) = x^2$ for all real x,

(a) Sketch the graph of f.

(b) Let $H(x) = g(f(x))$. Write an expression for $H(x)$.

(c) Find the domain and range of $H(x)$.

(d) Find an equation for the line tangent to the graph of H at the point where $x = \dfrac{\pi}{4}$.

(88-1)

4. Let f be the function given by $f(x) = \sqrt{x^4 - 16x^2}$.

(a) Find the domain of f.

(b) Describe the symmetry, if any, of the graph of f.

(c) Find $f'(x)$.

(d) Find the slope of the line normal to the graph of f at $x = 5$.

(91-3)

5. Let f be the function defined by $f(x) = (1 + \tan x)^{\frac{3}{2}}$ for $-\frac{\pi}{4} < x < \frac{\pi}{2}$

(a) Write an equation for the line tangent to the graph of f at the point where $x = 0$.

(b) Using the equation found in part (a), approximate $f(0.02)$.

(c) Let $f^{-1}(x)$ denote the inverse function of f. Write an expression that gives $f^{-1}(x)$ for all x in the domain of $f^{-1}(x)$.

(77-4)

6. Let f and g and their inverses f^{-1} and g^{-1} be differentiable functions and let the values of f, g and the derivatives f' and g' at $x = 1$ and $x = 2$ be given by the table below.

x	$f(x)$	$g(x)$	$f'(x)$	$g'(x)$
1	3	2	5	4
2	2	π	6	7

Determine the value of each of the following:

(a) The derivative of $f + g$ at $x = 2$

(b) The derivative of fg at $x = 2$

(c) The derivative of $\frac{f}{g}$ at $x = 2$

(d) $h'(1)$ where $h(x) = f(g(x))$

(e) The derivative of g^{-1} at $x = 2$