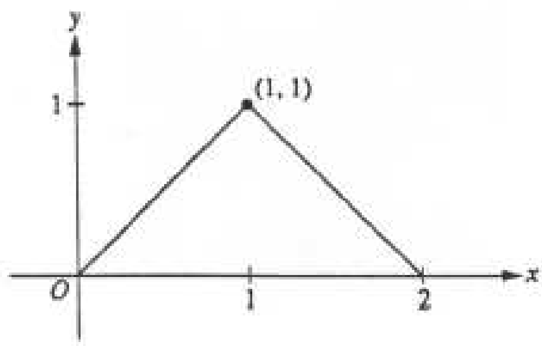
# AP PROBLEM SET #2 DERIVATIVES II

(93-5)

1.




The figure above shows the graph of $f'$, the derivative of a function $f$. The domain of $f$ is the set of all $x$ such that $0 < x < 2$.

(a) Write an expression for $f'(x)$ in terms of $x$.

(b) Given that $f(1) = 0$, write an expression for $f(x)$ in terms of $x$.

(c) In the $xy$-plane, sketch the graph of $y = f(x)$.

(89-4)

2. 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)

3. 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 $x = 0$.

(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 | | $\pi$ | 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 $x=2$