AP Practice:

A point moves on the x-axis in such a way that its velocity at time t $(t>0)$ is given by $v=\frac{\ln t}{t}$.

At what value of t does v attain its maximum?

(A) 1 (B) $e^{\frac{1}{2}}$ (C) e (D) $e^{\frac{3}{2}}$

(E) There is no maximum value for v.

$\frac{d}{dx}\left(\ln e^{2x}\right)=$

(A) $\frac{1}{e^{2x}}$ (B) $\frac{2}{e^{2x}}$ (C) $2x$ (D) 1 (E) 2

If $\sin x=e^{y}$, $0<x<\pi$, what is $\frac{dy}{dx}$ in terms of x?

(A) $-\tan x$ (B) $-\cot x$ (C) $\cot x$ (D) $\tan x$ (E) $\csc x$

$\int_{\pi/4}^{\pi/2}\frac{\cos x}{\sin x}dx=$

(A) $\ln\sqrt{2}$ (B) $\ln\frac{\pi}{4}$ (C) $\ln\sqrt{3}$ (D) $\ln\frac{\sqrt{3}}{2}$ (E) $\ln e$

What are the coordinates of the inflection point on the graph of $y=(x+1)\arctan x$?

(A) $(-1,0)$ (B) $(0,0)$ (C) $(0,1)$ (D) $\left(1,\frac{\pi}{4}\right)$ (E) $\left(1,\frac{\pi}{2}\right)$

If $F(x)=\int_{0}^{x}e^{-t^2}dt$, then $F'(x)=$

(A) $2xe^{-x^2}$ (B) $-2xe^{-x^2}$ (C) $\frac{e^{-x^2+1}}{-x^2+1}-e$

(D) $e^{-x^2}-1$ (E) e^{-x^2}

An equation for a tangent to the graph of $y=\arcsin\frac{x}{2}$ at the origin is

(A) $x-2y=0$ (B) $x-y=0$ (C) $x=0$

(D) $y=0$ (E) $\pi x-2y=0$

At $x = 0$, which of the following is true of the function f defined by $f(x) = x^2 + e^{-2x}$?

(A) f is increasing.
(B) f is decreasing.
(C) f is discontinuous.
(D) f has a relative minimum.
(E) f has a relative maximum.

1972 BC6

Consider the function f defined by $f(x) = \begin{cases} \dfrac{x}{\ln x} & \text{if } x > 0 \\ 1 & \text{if } x = 0 \\ \dfrac{-x}{\ln(-x)} & \text{if } x < 0 \end{cases}$

(a) For what values of x is f continuous?

(b) Is the graph of f symmetric with respect to

(i) the y-axis?
(ii) the origin?

(c) Find the coordinates of all relative maximum points.

(d) Find the coordinates of all relative minimum points.

1979 AB2

A function f is defined by $f(x) = xe^{-2x}$ with domain $0 \le x \le 10$.

(a) Find all values of x for which the graph of f is increasing and all values of x for which the graph is decreasing.

(b) Give the x- and y-coordinates of all absolute maximum and minimum points on the graph of f. Justify your answers.

1980 AB4/BC1

The acceleration of a particle moving along a straight line is given by $a = 10e^{2t}$.

(a) Write an expression for the velocity v, in terms of time t, if $v = 5$ when $t = 0$.

(b) During the time that the velocity increases from 5 to 15, how far does the particle travel?

(c) Write an expression for the position s, in terms of time t, of the particle if $s = 0$ when $t = 0$.