AP Questions Chapter 5

Name____

1) If $f(x) = e^{\sin x}$, how many zeros does f ′(x) have on the closed interval [0, 2π]?

(A) 1 (B) 2 (C) 3 (D) 4 (E) 5

2) $\int \frac{1}{\sqrt{4-x^2}}\,dx =$

(A) $\arcsin\frac{x}{2}+C$ (B) $2\sqrt{4-x^2}+C$ (C) $\arcsin x + C$

(D) $\sqrt{4-x^2}+C$ (E) $\frac{1}{2}\arcsin\frac{x}{2}+C$

3) If y = x(lnx)^2, then $\frac{dy}{dx}$ =

(A) 3(lnx)^2

(B) (lnx)(2x + lnx)

(C) (lnx)(2 + lnx)

(D) (lnx)(2 + xlnx)

(E) (lnx)(1 + lnx)

4) $4\int_1^{e^2} \frac{x-x^3}{x^2}\,dx =$

(A) 3 – e^2 (B) 3 – e^4 (C) 5 – e^2 (D) 5 – e^4 (E) 10 –2e^4

5) The function f(x) = tan(3^x) has one zero in the interval [0, 1.4]. The derivative at this point is (calc.)

(A) 0.411

(B) 1.042

(C) 3.451

(D) 3.763

(E) undefined

6) A particle moves along the y-axis so that its velocity v at time $t \geq 0$ is given by $v(t) = 1 - \tan^{-1}(e^t)$. At time $t = 0$, the particle is at $y = -1$. (Note: $\tan^{-1} x = \arctan x$)

(a) Find the acceleration of the particle at time $t = 2$.

(b) Is the speed of the particle increasing or decreasing at time $t = 2$? Give a reason for your answer.

(c) Find the time $t \geq 0$ at which the particle reaches its highest point. Justify your answer.

(d) Find the position of the particle at time $t = 2$. Is the particle moving toward the origin or away from the origin at time $t = 2$? Justify your answer.

7)

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
1	6	4	2	5
2	9	2	3	1
3	10	−4	4	2
4	−1	3	6	7

The functions f and g are differentiable for all real numbers, and g is strictly increasing. The table above gives values of the functions and their first derivatives at selected values of x. The function h is given by $h(x) = f(g(x)) - 6$.

(a) Explain why there must be a value r for $1 < r < 3$ such that $h(r) = -5$.

(b) Explain why there must be a value c for $1 < c < 3$ such that $h'(c) = -5$.

(c) Let w be the function given by $w(x) = \int_1^{g(x)} f(t)\,dt$. Find the value of $w'(3)$.

(d) If g^{-1} is the inverse function of g, write an equation for the line tangent to the graph of $y = g^{-1}(x)$ at $x = 2$.