Name____ Date______________ Per__________

TEST: AP Calculus: Test—5.6-6.2. CALCULATOR PERMITTED
PART I: Multiple Choice. Put the Capital Letter of the correct answer choice in the space to the left of each problem number.

_____ 1. If $\dfrac{dy}{dx} = 7 + 5\tan^2 x$ and $f(0) = 4$, then the particular solution will be

(A) $7x + 5\sec^2 x - 1$ (B) $2x + 5\tan x + 4$ (C) $2x + 5\tan^2 x + 4$
(D) $-2x - 5\tan x + 4$ (E) $7x + 5\sec x - 1$

_____ 2. The graph of $f(x)$ is shown in the figure at right. If $F(x)$ is an antiderivative of $f(x)$ and $\int_2^8 f(x)dx = 14$, Find the value of $\int_8^1 f(x)dx$.

(A) -16 (B) -16.5 (C) -17.5 (D) -17 (E) -15.5

_____ 3. The most general antiderivative of $f(x) = (\sec x)\left(\dfrac{\cot x}{\sin x}\right)$ is

(A) $\sec x \tan x + C$ (B) $-\csc x \cot x + C$ (C) $-\cot x + C$ (D) $\cos x + C$

_____ 4. The volume of a cylindrical tin can with a top and bottom is to be 16π cubic inches. If a minimum amount of tin is to be used to construct the can, what must be the height, in inches, of the can?

(A) $2\sqrt[3]{2}$ (B) $2\sqrt{2}$ (C) $2\sqrt[3]{4}$ (D) 4 (E) 8

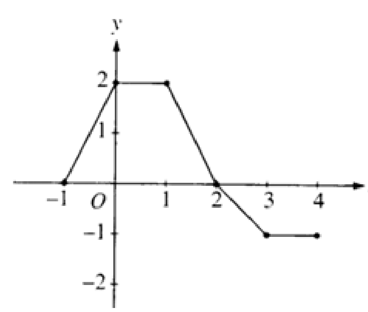
_____ 5. If $\int_{-1}^{3} f(x)dx = 2$ and $\int_{2}^{3} f(x)dx = -1$, find $\int_{-1}^{2} 2f(x)dx$

(A) 2 (B) -3 (C) 3 (D) -6 (E) 6

_____ 6. The approximate value of $y = \sqrt{9 + \cos x}$ at $x = \dfrac{\pi}{2} + \dfrac{1}{10}$, obtained from the tangent to the graph at $x = \dfrac{\pi}{2}$ is

(A) 2.94 (B) 2.96 (C) 2.98 (D) 3.01 (E) 3.03

_____ 7. Given L feet of fencing, what is the maximum number of square feet that can be enclosed if the fencing is used to make three sides of a rectangular pen, using an existing wall as the fourth side? (A) $L^2/4$ (B) $L^2/8$ (C) $L^2/9$ (D) $L^2/16$ (E) $2L^2/9$



_____ 8. The graph of a piecewise-linear function f, for $-1 \le x \le 4$, is shown **at right**. What is the value of $\int_{-1}^{4} f(x)dx$?

(A) 1 (B) 2.5 (C) 4 (D) 5.5 (E) 8

_____ 9. The radius of a circle is increasing. At a certain instant, the rate of increase in the area of the circle is numerically equal to twice the rate of increase in its circumference. What is the radius of the circle at that instant?

(A) $\dfrac{1}{2}$ (B) 1 (C) $\sqrt{2}$ (D) 2 (E) 4

PART II: Free Response.
Show all work in the space provided below the line.

10. I was out collecting data yesterday and tried to use it to approximate a **differentiable** function $y = f(x)$ represented in the table below.

x	**0**	**5**	**10**	**19**	**28**	**35**	**42**
y	**30**	**6**	**1**	**2**	**0**	**-1**	**0**

. . . use my data to **approximate** $\int_0^{42} f(x)dx$ using the following methods (**<u>simplify your answers</u>**):

(a) Left end-point Riemann Sums ($n=6$).
(b) Right end-point Riemann Sums ($n=6$)
(c) Midpoint Riemann Sums ($n=3$)
(d) Trapezoidal Rule ($n=6$)
(e) Can any of the above calculations represent the approximate area under the function $y = f(x)$ on $[0,42]$? Why or why not?
(f) **Approximate** $f'(15)$ from the table of values. Make sure to show your difference quotient.
(g) If the **<u>secant</u>** line on the interval $[10,19]$ was used to approximate $f(15)$, given that $f'(x) > 0$ and $f''(x) > 0$ for all $x \in (10,19)$, would this approximation of $f(15)$ be an over or under approximation? Justify.