AP Calculus Fall Final Exam up to 10 % Bonus on Final exam grade.

Question 1

$$\lim_{x \to 0} \tan\left(\frac{\sin 2\pi x}{6x}\right) =$$

(a) 0

(b) $1/\sqrt{3}$

(c) 1

(d) $\sqrt{3}$

(e) The limit does not exist

Question 2

A function f is defined on an interval $[a, b]$. Which of the following statements could be false?

I. If f is differentiable on (a, b) and if f has no zeros on $[a, b]$, then $f(a)$ and $f(b)$ have the same sign.

II. If f is continuous on $[a, b]$, and if $f(a) < 0$ and $f(b) > 0$, then there must be a point $c \in (a, b)$ such that $f(c) = 0$.

III. If f is continuous on $[a, b]$ and there is a point c in (a, b) such that $f(c) = 0$, then $f(a)$ and $f(b)$ have opposite sign.

IV. If f is differentiable on an interval $I \supset [a, b]$, and if $f(a)$ and $f(b)$ have opposite sign, then there must be a point $c \in (a, b)$ such that $f(c) = 0$.

(a) II only

(b) II and IV

(c) I, III and IV

(d) II and III

(e) I and III

If $\dfrac{d}{dx}f(x) = g(x)$ and if $h(x) = e^{2x}$, then $\dfrac{d}{dx}f(h(x)) =$

(a) $g\left(e^{2x}\right)$

(b) $2e^{2x}\,g\left(e^{2x}\right)$

(c) $2e^{2x}\,g(x)$

(d) $e^{2x}g'(x)$

(e) $e^{2x}g\left(e^{2x}\right)$

Question 4

Evaluate:

$$\frac{d}{dx}\int_{3}^{-5x^2}\frac{2}{e^{4t}}dt$$

Question 5

$\int_{2}^{3}\dfrac{x}{x^2+1}\,dx =$

(A) $\dfrac{1}{2}\ln\dfrac{3}{2}$ (B) $\dfrac{1}{2}\ln 2$ (C) $\ln 2$ (D) $2\ln 2$ (E) $\dfrac{1}{2}\ln$

Question 6

If $\int_{0}^{k}(2kx - x^2)dx = 18$, then $k =$

(A) -9 (B) -3 (C) 3 (D) 9 (E) 18

Question 7

The radius of a sphere is increasing at a constant rate of 5 cm/sec. At the instant when the volume of the sphere is increasing at 35 cm3/sec, What is the surface area of the sphere?