Practice AP Questions 2.1-2.4 Name:_____

1) If f(x) = $\sqrt{4\sin x + 2}$, then f'(0) =

(A) -2 (B) 0 (C) 1 (D) $\sqrt{2}/2$ (E) $\sqrt{2}$

2) A particle moves along the x-axis in such a way that its position at time t is given by $x(t) = \frac{1-t}{1+t}$. What is the acceleration of the particle at time t=0?

(A) -4

(B) -2

(C) -3/5

(D) 2

(E) 4

3) Let f be the function given by f(x) = tanx and let g be the function given by g(x) = x^2. At what value of x in the interval $0 \le x \le \pi$ do the graphs of f and g have parallel tangent lines?

(A) 0

(B) 0.660

(C) 2.083

(D) 2.194

(E) 2.207

4) Two functions f(x) and g(x) are differentiable. If h(x) = x^2g(x) – f(3x + 1), determine the value of h'(x).

(A) 2xg'(x) – 3f'(3x + 1)

(B) 2xg'(x) – f'(3)

(C) x^2g'(x) + 2xg(x) – f'(3x + 1)

(D) x^2g'(x) + 2xg(x) – 3f'(3x + 1)

(E) x^2g'(x) – f'(3x + 1)

5) Let f and g be differentiable functions such that

$$f(1)=4,\ g(1)=3,\ f'(3)=-5$$
$$f'(1)=-4,\ g'(1)=-3,\ g'(3)=2$$

If h(x) = f(g(x)), then h'(1) =

(A) -9 (B) 15 (C) 0 (D) -5 (E) -12

6) If $f(x) = (2 + 3x)^4$, then the fourth derivative of f is

(A) 0 (B) 4!(3) (C) $4!(3^4)$ (D) $4!(3^5)$ (E) 4!(2 + 3x)

7) The $\lim_{h\to 0}\frac{|x+h|-|x|}{h}$ at x = 3 is

(A) -1 (B) 0 (C) 1 (D) 3 (E) nonexistent

8) If y = 7 is a horizontal asymptote of a rational function f, then which of the following must be true?

(A) $\lim_{x\to 7} f(x)=\infty$ (B) $\lim_{x\to -\infty} f(x)=-7$ (C) $\lim_{x\to 0} f(x)=7$ (D) $\lim_{x\to 7} f(x)=0$ (E) $\lim_{x\to\infty} f(x)=7$

9) Let f(x) be a continuous and differentiable function. The table below gives the values of f(x) and f'(x), the derivative of f(x), at several values. If $g(x) = \frac{1}{f(x)}$, what is the value of g'(2)?

x	1	2	3	4
f(x)	-3	-8	-9	0
f'(x)	-5	-4	3	16

(A) -1/8

(B) 0

(C) 1/16

(D) 1/64

(E) 16

10) If $f(x) = \cos^2(x)$, then $f''(\pi) =$

(A) -2 (B) 0 (C) 1 (D) 2 (E) 2π

11) Two particles leave the origin at the same time and move along the y-axis with their respective positions determined by the functions $y_1 = \cos 2t$ and $y_2 = 4\sin t$ for $0 < x < 6$. For how many values of t do the particles have the same acceleration?

(A) 0 (B) 1 (C) 2 (D) 3 (E) 4

12) Evaluate $\lim_{h\to 0} \dfrac{5\left(\frac{1}{2}+h\right)^4 - 5\left(\frac{1}{2}\right)^4}{h}$.

(A) 5/2 (B) 5/16 (C) 40 (D) 160 (E) The limit DNE

13) If *f* is continuous on [2, 6], with f(2) = 20 and f(6) = 10, then the Intermediate Value Theorem says which of the following is true?

I. f(x) = 25 does not have a solution on [2, 6]

II. f(x) = 17 has a solution on [2, 6]

III. f(x) = 0 has a solution on [2, 6]

(A) I only (B) II only (C) III only (D) I and II only (E) I, II, and III