Name _____ Hour _____

AP Calculus AB **Test Review** **Chapter 3.3 – 3.7**

1. **Basic Derivatives**

$y = 5cosx$ $y = 3\sqrt{x}$ $y = -2cotx$

$y = 5x^4 + 10x^2 - 20$ $y = 101$ $y = 3secx$

$y = \frac{-2}{x}$ $y = 5x^{-6}$ $y = -2sinx$

$y = cscx$ $y = \frac{1}{2}tanx$ $y = \frac{1}{x^5}$

In 2 - 10, find y'.

2. $y = \dfrac{(2x-5)^{15}}{(4x+1)^{20}}$

3. $y = x^4 \cdot \csc(4x)$

4. $y = \left(5x^4 + \sqrt{x} - 12\right)^5$

5. $y = 5\cos\left(\dfrac{4}{x^3}\right)$

6. $y = \dfrac{x\tan x - 5x}{2x}$

7. $y = \tan^{10}(3x)$

8. $y = (10x^2 + 11x)^{20}$

9. $y = \dfrac{-4x^2 - 3}{2x}$

10. $y = \sqrt{x^2+1} \cdot \sec^2(3x)$

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11. Find $y'|_{x=\frac{\pi}{3}}$, if $y = sin^2(2x + \pi)$

12. Find $\frac{dy}{dx}\Big|_{x=\frac{\pi}{2}}$ if $y = \sqrt{x} \cdot \cos x$

13. Find the 90th derivative of the $y = sinx$

14. A ***normal line*** is the line perpendicular to the line tangent to a curve at a point. Find the equation of the normal line to the to the curve $y = \sin(\cos x)$ at $x = \frac{\pi}{2}$.

15. For what point(s) on $y = 2x^2 + 5x - 1$ does the instantaneous rate of change of y with respect to x of the function equal the average rate of change over the interval $[0,1]$?

16. Find the value of x where the line tangent to the function $y = (3x + 2)^4$ is parallel to $12x + y = 5$.

17. Find the equation of the line tangent to $f(x)$ at $x = 2$. $f(x) = \frac{(x-1)^2}{(5-3x)^4}$.

18. Find the equation of the line tangent to $y = x^2 \cdot \sqrt{5 - x^2}$ at $x = 2$.

19. Use the given values to find $h'(1)$. if $h(x) = f(g(x))$

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

20. Use the given values to find $f'(5)$ if $f(x) = [g(x)]^3 + \frac{2g(x)}{h(x)}$

$f(5) = 3$ $g(5) = 1$ $g'(5) = 2$ $h(5) = -1$ $h'(5) = -2$ $h'(2) = 0$

21. Use $f(16) = 6$, $f'(16) = 1$ to find $g'(8)$ if $g(x) = f(2x) \cdot \sqrt{2x}$

22. TRUE OR FALSE The function $f(x) = -3\sqrt{x}$ has no lines tangent to it that are horizontal.

23. Let A be the area of a circle of radius r. At a certain instant, the area is $100\pi\, cm^2$ and the radius is decreasing at 5 cm per second. At what rate is the area decreasing at that instant.

24. A spherical hot air balloon is being inflated. If air is blown into the balloon at the rate of 2 ft^3/sec, find how fast the radius of the balloon is changing when the radius is 3 feet.

25. Practice your Cones