AP Calculus Chapter 2 Review Worksheet

Non- Calculator Problems.

1. $\frac{d}{dx}\left(7x^4 - \frac{1}{x^3} + 5\sin x\right)$

$28x^3 + \frac{3}{x^4} + 5\cos x$

2. $\frac{dy}{dx}\left(17x^4 \cos x\right)$

$68x^3\cos x - 17x^4 \sin x$

3. Find $f'(x)$ if $f(x) = \frac{x^2 - 1}{x - 1}$

$f(x) = x + 1$

1

4. Given $f(t) = \frac{4t^2 - t}{\tan(t)}$, find $f'(t)$

$\frac{(8t-1)\tan t - (4t^2 - t)\sec^2 t}{\tan^2 t}$ OR $\frac{(8t-1)\sin t\cos t - 4t^2}{\sin^2 t}$

5. Find $f'(1)$ if $f(x) = \left(x^4 - x^2\right)\left(2x^3 + x\right)$.

6

6. Find $\left.\frac{dy}{dx}\right|_{x=2}$ if $y = \frac{x^2 + 2x}{x^4 - x^3}$

$-\frac{7}{4}$

7. Find $\frac{d}{dt}$ at $t = 1$ if $y = \frac{t^6 + 2}{t^6 - 2}$

-24

8. Find $\frac{dy}{d\theta}$ if $y = \sin^6\theta$

$6\sin^5\theta\cos\theta$

9. Find $\frac{dy}{dx}$ if $y = \sqrt{\sin 3x}$

$\frac{3\cos(3x)}{2\sqrt{\sin(3x)}}$

10. If $f(x) = \left(3x^5 - 2\right)^8$ Find $f'(x)$

$120x^4(3x^5 - 2)^7$

11. Find y' if $y = 4\cos^3(7x)$

$-84\cos^2(7x)\sin(7x)$

12. Find $\frac{dy}{dx}$ if $y = \sin\left(\cos\left(\sqrt{x}\right)\right)$

$-\frac{\cos(\cos\sqrt{x})\sin\sqrt{x}}{2\sqrt{x}}$

13. Find $\frac{dy}{dx}$ at $(1,1)$ if $x^{\frac{1}{2}} + y^{\frac{1}{2}} = 2y^2$

$\frac{1}{7}$

14. Find $\frac{dy}{dx}$ at $(2,1)$ if $\frac{x+y}{x-y} = 3$

$\frac{1}{2}$

15. Find $\frac{d^2y}{dx^2}$ given $x^3 - 8y^3 = 60$

$\frac{dy}{dx} = \frac{x^2}{8y^2}$ $\frac{d^2y}{dx^2} = \frac{8xy^3 - x^4}{32y^5}$

16. Find $\frac{d^2y}{dx^2}$ if $\cos y = \sin x + 1$

$\frac{dy}{dx} = -\frac{\cos x}{\sin y}$ $\frac{d^2y}{dx^2} = \frac{\sin^2 y \sin x - \cos^2 x \cos}{\sin^3 y}$

17. Find the equation of the tangent line to the graph of $y = \frac{x^2+4}{x-6}$ at $x = 5$.

$y + 29 = -39(x-5)$

18. Find $\lim_{\Delta x \to 0} \frac{\sin\left(\frac{\pi}{3} + \Delta x\right) - \sin\left(\frac{\pi}{3}\right)}{\Delta x}$

$* \lim_{\Delta x \to 0} \frac{f(x+\Delta x) - f(x)}{\Delta x}$

$f(x) = \sin x$ $f'\left(\frac{\pi}{3}\right)$

$\frac{1}{2}$

19. Find the values of x where the tangent to the graph of $y = 2x^3 - 8x$ has a slope equal to the slope of $y = x$.

$y' = 6x^2 - 8$

$y' = 1$

$\pm\sqrt{\frac{3}{2}}$

20. Find the coordinates where the tangent to the graph of $y = 8 - 3x - x^2$ is parallel to the x-axis.

$\left(-\frac{3}{2}, \frac{41}{4}\right)$

21. Find the equation of the normal line to the graph of $y = \cos(4x)$ at $x = \frac{\pi}{12}$.

$y - \frac{1}{2} = \frac{1}{2\sqrt{3}}\left(x - \frac{\pi}{12}\right)$

22. Given $u(0) = 5$ $u'(0) = 3$ $v(0) = -1$ $v'(0) = 2$
$u'(-1) = 8$ $v'(-1) = -3$ $u'(5) = -2$ $v'(5) = 4$

Find $\frac{d}{dx}$ at $x = 0$ for the following functions.

a) $y = 7v - 2u$

8

b) $y = uv$

7

c) $y = \frac{u}{v}$

-13

d) $y = v(u)$

12