

AP Calculus

Simplify each of the following expressions WITHOUT a calculator!

1. $(a+b)^2$

$a^2 + 2ab + b^2$

2. $(d-3)^3$

$(d-3)(d^2 - 6d + 9)$
 $d^3 - 9d^2 + 27d - 27$

3. $9^{3/2}$

$(3^2)^{3/2} = 3^3 = 27$

4. $\frac{a^2+ba}{a^2}$

$\frac{a^2}{a^2} + \frac{ba}{a^2}$
 $1 + \frac{b}{a}$

5. $\sqrt{a^2-b^2}$

$\sqrt{(a+b)(a-b)}$
 $??$

6. $\frac{a}{b} + \frac{c}{d}$

$\frac{ad+bc}{bd}$

7. $\frac{7}{\frac{1}{49}x^2}$

$\frac{7}{x} \cdot \frac{x^2}{49}$
 $\frac{x}{7}$

8. $\frac{2x^{-2}}{x^{-1}y^3}$

$\frac{2x}{x^2y^3} = \frac{2}{xy^3}$

9. $\frac{10t+u}{10u+t}$

$??$

10. $3(2x)^3(3y)^2$

$3(2x)(2x)(2x)(3y)(3y)$
 $216x^3y^2$

11. $\log_{10}100$

2

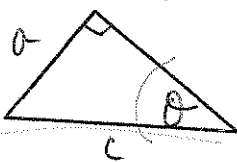
12. \log_28

3

13. Solve $x(x-2) = 24$

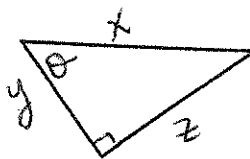
$x^2 - 2x - 24 = 0$
 $(x-6)(x+4)$
 $x=6, x=-4$

14.



$\sin\theta = \frac{a}{c}$
 $\cos\theta = \frac{b}{c}$
 $\tan\theta = \frac{a}{b}$

15.



$\sec\theta = \frac{x}{y}$
 $\csc\theta = \frac{x}{z}$
 $\cot\theta = \frac{y}{z}$

16. $\sin(A+B) =$

$\sin A \cos B + \cos A \sin B$

17. $\cos(A+B) =$

$\cos A \cos B - \sin A \sin B$

TOOL
BOX

STORY OF SINDHAR & COSETTE

Find the derivative function of each.

18. $y = 8x^3$

$$\frac{dy}{dx} = 24x^2$$

19. $y = 8(3x^2 - 1)^3$

$$\frac{dy}{dx} = 24(3x^2 - 1)^2 (6x)$$

$$y' = 144x(3x^2 - 1)^2$$

20. $y = 8x^3(5x^2 - 1)$

$$y' = 24x^2(5x^2 - 1) + 8x^3 \cdot 10x$$

$$= 120x^4 - 24x^2 + 80x^3$$

$$\frac{dy}{dx} = 200x^4 - 24x^2$$

21. $y = \frac{3x+8}{2x-1}$

$$\frac{dy}{dx} = \frac{(2x-1)(3) - (3x+8)(2)}{(2x-1)^2}$$

$$y' = \frac{-19}{(2x-1)^2}$$

22. $y = 4\sin(3x^4)$

$$\frac{dy}{dx} = 4\cos(3x^4) \cdot 12x^3$$

$$y' = 48x^3\cos(3x^4)$$

23. $y = -3\tan^4(5x^6)$

$$y' = -12\tan^3(5x^6) \cdot \sec^2(5x^6) \cdot 30x^5$$

$$y' = -360x^5 \tan^3(5x^6) \sec^2(5x^6)$$

24. $y = 3x^5 \cdot \sec(5-x)$

$$y' = 15x^4 \sec(5-x) - 3x^5 \sec(5-x) \tan(5-x)$$

25. Find the equation of the line tangent to $y = -3x^4 + 5$ at $x = 2$.

$$y = -12x^3$$

$$y = -12(2)^3 = -96$$

$$y = -3(2)^4 + 5$$

$$y = -43$$

$$y = -96(x-2) - 43$$