

Al-Saudia Virtual Academy
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2nd Formula for Differentiation
(Substitution Method)

$$\text{If } y = (ax + b)^n \text{ then } \frac{dy}{dx} = n(ax + b)^{n-1} \frac{d}{dx}(ax + b)$$

Example

$$Y = (x^2 + 2x + 3)^3$$

$$\frac{dy}{dx} = \frac{d}{dx} (x^2 + 2x + 3)^3$$

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

$$= 3(x^2 + 2x + 3)^2 \cdot (2x + 2)$$

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

These type of problems can also be solved by “substitution method”

Problems:

1. $f(x) = \sqrt{x + 1}$
2. $f(x) = (3x^2 + 1)^2$
3. $f(x) = (x^5 + 2x)^2$
4. $f(x) = (x^2 + 4)^2$
5. $f(x) = (2x^3 - 1)^3$
6. $f(x) = \sqrt{x^2 - 2x + 2}$
7. $f(x) = \sqrt{1 + \sqrt{x}}$
8. $Z = \sqrt{1 - 4w^2}$
9. $Y = 3\sqrt{2x - 4}^2$
10. $Y = (2x + 5)^5$
11. $Y = (1 - 5x)^4$
12. $Y = (3x + 7)^{1/2}$

13. $Y = (1-2x)^2$

14. $Y = (x^2 - 4)^5$

15. $Y = \sqrt{1 - 2x^2}$

16. $Y = \sqrt{x^2} - 1$

17. $Y = 3\sqrt{(4-x)^2}$

18. $Y = x^{1/2} - 1$

19. $Y = 4^{1/x}$

20. $Y = \sqrt{1 + x^2}$

21. $Y = \sqrt{1 - x^2}$

22. $Y = \sqrt{1 - x + x^2}$

23. $Y = (1 - 2x^2)^4$

24. $Y = 1/\sqrt{a^2 - x^2}$

25. $Y = 1/\sqrt{2x^2 - 3x + 4}$

26. $Y = 1/(x^2 + y^2)^2$

27. $Y = 3\sqrt{(x^2 + 2x + 5)^4}$

28. $Y = 1/\sqrt{x^2 - 5x}$

29. $Y = 3\sqrt{x^2 - 3x}^{2/3}$

30. $Y = 3\sqrt{(x^2 + 5x + 6)^2}$

31. $Y = 1/5x - 3 ; 3/\sqrt{x + 2}$

32. $Y = 3x/2x + 1$

33. $\underline{y} = x^2 + 1/3 ; 2x \ 1/x + 3$

34. $y = 4x + 1/x^2 - 5$