Problems on Chain Rule

Calculus I, MTH 231
Instructor: Abhijit Champanerkar
Topic: Chain Rule

Find y' using the Chain Rule. The starred problem at the end need applying the chain rule twice. For these problems you have to know the power rule very well especially derivatives of $x^2, x^3, x^4, 1/x, 1/x^2, 1/x^3, \sqrt{x}, \sqrt[3]{x}, 1/\sqrt{x}$.

1. $y = \sin^2 x$

2. $y = \sin^5 x$

3. $y = \cos^7 x$

4. $y = \cos^{10} x$

5. $y = \tan^3 x$

6. $y = \tan^8 x$

7. $y = \dfrac{1}{\sin x}$

8. $y = \dfrac{1}{\cos^2 x}$

9. $y = \dfrac{1}{\tan^3 x}$

10. $y = \sqrt{\sin x}$

11. $y = \sqrt[3]{\cos x}$

12. $y = \sin(x^2)$

13. $y = \sin(x^5)$

14. $y = \cos(x^{11})$

15. $y = \sin(2^x)$

16. $y = 2^{\sin x}$

17. $y = \tan(e^x)$

18. $y = e^{\tan x}$

19. $y = \sin(\ln x)$

20. $y = \ln(\sin x)$

21. $y = \cos(\log_3 x)$

22. $y = \log_3(\cos x)$

23. $y = \sin^3(3x^4 + x^2 + 2)$

24. $y = \cos^5(2x^5 - x^3 + 4)$

25. $y = \sin(x^5) + \cos^5 x$

26. $y = \sin(3x^2 - 5)$

27. $y = 3\sin^2 x - 5$

28. $y = 3\sin^2 x - 7\cos^4 x$

29. $y = 13\tan^5 x + 6\sin^4 x + 23\cos^2 x$

30. $y = \sin^2 x + \dfrac{1}{\cos^2 x}$

31. $y = \sqrt[4]{\sin^7 x} + \dfrac{1}{\sqrt{\cos x}}$

32. $y = \dfrac{1}{1 - \cos x}$

33. $y = \ln(4x - 3)$

34. $y = \ln(1 + x^2)$

35. $y = \ln(x^3 - x^2 + 1)$

36. $y = \ln(5 + \sin x)$

37. * $y = 2^{3+\sin^2 x}$

38. * $y = e^{5+\cos^3 x}$

39. * $y = \ln(5 + \sin^2 x)$

40. * $y = \dfrac{1}{2 - \sin^2 x}$