Problems on Differentiation

Basic concepts:

1. Derive the first principle of derivative.

2. What are the physical significance of the operator $\frac{d}{dx}$.

3. Find the slope of the function $y = sinx$ at point $x = 1$.

4. Find the slope of the function $y = x + e^x$ at point $x = 2$.

Sum or difference rule, product rule, chain rule, quotient rule, Function as Power of another Function:

1. $y = \sqrt{x}$

2. $y = \sqrt{x} + \frac{1}{\sqrt{x}}$

3. $y = e^x + 2\sin x - \frac{1}{2}\ln x$

4. $y = x^2 \ln x$

5. $y = x^2 \tan^{-1} x$

6. $y = x \operatorname{Sin}^{-1} x$

7. $y = a^x e^x \cos^{-1} x$

8. $y = 2^x e^x \sin^{-1} x$

9. $y = \sqrt[3]{x}\, b^x\, lnx\, secx$

10. $y = e^x (sinx + cosx)$

11. $y = \frac{1+sinx}{1+cosx}$

12. $y = \frac{e^x}{1-2x}$

13. $y = \sqrt{x}$

14. $y = \sqrt{x} + \frac{1}{\sqrt{x}}$

15. $y = e^x + 2\sin x - \frac{1}{2}\ln x$

16. $y = x^2 \ln x$

17. $y = x^2 \tan^{-1} x$

18. $y = x \operatorname{Sin}^{-1} x$

19. $y = a^x e^x \cos^{-1} x$

20. $y = 2^x e^x \sin^{-1} x$

21. $y = \sqrt[3]{x}\, b^x\, lnx\, secx$

22. $y = e^x (sinx + cosx)$

23. $y = \frac{1+sinx}{1+cosx}$

24. $y = \frac{e^x}{1-2x}$

25. $y = \ln(x + \sqrt{x^2 + 2})$

26. $y = e^{\sqrt{\cot x}}$

27. $y = e^{\tan^{-1} x}$

28. $y = \tan(\ln(\sin e^{x^2}))$

29. $y = \sin^{-1}(e^{\cot^- x})$

30. $y = x^2 \ln x$

31. $y = e^{\sin x} \sin(e^x)$

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