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4. DIFFERENTIAL CALCULUS AND APPLICATIONS

1. What is the derivative of a constant function?

a) 1

b) 0

c) The derivative does not exist

d) Undefined

Answer: b) 0

2. What is the derivative of x^n, where n is a constant?

a) nx^(n-1)

b) n^(n-1)x^n

c) nx^n

d) (n+1)x^(n-1)

Answer: a) nx^(n-1)

3. What is the derivative of e^x?

a) e^x

b) e^x + 1

c) e^(x+1)

d) The derivative does not exist

Answer: a) e^x

4. What is the derivative of ln(x)?

a) 1/x

b) x

c) 1/(x+1)

d) The derivative does not exist

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Answer: a) 1/x

5. What is the derivative of sin(x)?

a) cos(x)

b) -cos(x)

c) sin(x)

d) The derivative does not exist

Answer: a) cos(x)

6. What is the derivative of cos(x)?

a) -sin(x)

b) sin(x)

c) cos(x)

d) The derivative does not exist

Answer: a) -sin(x)

7. What is the derivative of tan(x)?

a) sec^2(x)

b) csc^2(x)

c) cos^2(x)

d) The derivative does not exist

Answer: a) sec^2(x)

8. What is the derivative of a constant multiplied by a function?

a) The constant

b) The derivative of the constant

c) The derivative of the function

d) The product of the constant and the derivative of the function

Answer: d) The product of the constant and the derivative of the function

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9. What is the derivative of a sum of functions?

a) The sum of the derivatives of the functions

b) The derivative of the sum of the functions

c) The product of the functions

d) The sum of the functions

Answer: a) The sum of the derivatives of the functions

10. What is the derivative of a difference of functions?

a) The difference of the derivatives of the functions

b) The derivative of the difference of the functions

c) The product of the functions

d) The difference of the functions

Answer: a) The difference of the derivatives of the functions

11. What is the derivative of f(x) = x^2 + 3x - 2?

a) 2x + 3

b) x + 3

c) 2x + 2

d) 2x - 3

Answer: a) 2x + 3

12. What is the derivative of f(x) = 5x^3 - 2x^2 + 4x - 1?

a) 15x^2 - 4x + 4

b) 15x^2 - 4x - 4

c) 15x^2 + 4x - 4

d)15x^2 - 4x + 4

Answer: a) 15x^2 - 4x + 4

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13. What is the derivative of f(x) = 1/x?

a) -1/x^2

b) -x

c) 1/x^2

d) The derivative does not exist

Answer: a) -1/x^2

14. What is the derivative of f(x) = e^(2x + 1)?

a) 2e^(2x + 1)

b) e^(2x)

c) 2e^(2x)

d) The derivative does not exist

Answer: a) 2e^(2x + 1)

15. What is the derivative of f(x) = sin(3x)?

a) 3cos(3x)

b) cos(3x)

c) 3sin(3x)

d) The derivative does not exist

Answer: a) 3cos(3x)

16. What is the derivative of f(x) = cos(2x)?

a) -2sin(2x)

b) sin(2x)

c) 2cos(2x)

d) The derivative does not exist

Answer: a) -2sin(2x)

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17. What is the derivative of f(x) = tan(4x)?

a) 4sec^2(4x)

b) sec^2(4x)

c) 4tan(4x)

d) The derivative does not exist

Answer: a) 4sec^2(4x)

18. What is the derivative of f(x) = 3x^2 + 2x - 1?

a) 6x + 2

b) 3x^2 + 2

c) 6x - 1

d) 3x^2 - 1

Answer: a) 6x + 2

19. What is the derivative of f(x) = 4x^3 - 2x^2 + 5x - 3?

a) 12x^2 - 4x + 5

b) 12x^2 - 4x - 5

c) 12x^2 + 4x - 5

d) 12x^2 + 4x + 5

Answer: a) 12x^2 - 4x + 5

20. What is the derivative of f(x) = e^(2x - 1)?

a) 2e^(2x - 1)

b) e^(2x)

c) 2e^(2x)

d) The derivative does not exist

Answer: a) 2e^(2x - 1)

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21. What is the derivative of f(x) = sin(2x + 1)?

a) 2cos(2x + 1)

b) cos(2x)

c) 2sin(2x)

d) The derivative does not exist

Answer: a) 2cos(2x + 1)

22. What is the derivative of f(x) = cos(3x - 2)?

a) -3sin(3x - 2)

b) sin(3x)

c) 3cos(3x)

d) The derivative does not exist

Answer: a)-3sin(3x - 2)

23. What is the derivative of f(x) = tan(5x + 3)?

a) 5sec^2(5x + 3)

b) sec^2(5x)

c) 5tan(5x)

d) The derivative does not exist

Answer: a) 5sec^2(5x + 3)

24. What is the derivative of f(x) = x^2 * e^x?

a) x^2 * e^x

b) 2x * e^x + x^2 * e^x

c) 2x * e^x

d) x^2 * e^(x+1)

Answer: b) 2x * e^x + x^2 * e^x

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25. What is the derivative of f(x) = sin(x) + cos(x)?

a) cos(x) - sin(x)

b) sin(x) + cos(x)

c) cos(x) + sin(x)

d) The derivative does not exist

Answer: a) cos(x) - sin(x)

26. What is the derivative of f(x) = e^x * ln(x)?

a) e^x * ln(x)

b) e^x + ln(x)

c) e^x * (1/x) + ln(x)

d) e^(x+1) * ln(x)

Answer: c) e^x * (1/x) + ln(x)

27. What is the second derivative of f(x) = 3x^2 + 2x - 1?

a) 6x + 2

b) 3x^2 + 2

c) 6

d) 0

Answer: c) 6

28. What is the second derivative of f(x) = 4x^3 - 2x^2 + 5x - 3?

a) 12x^2 - 4x + 5

b) 12x^2 - 4x - 5

c) 12x^2 + 4x - 5

d) 12x^2 + 4x + 5

Answer: a) 12x^2 - 4x + 5

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29. What is the second derivative of f(x) = e^(2x - 1)?

a) 2e^(2x - 1)

b) e^(2x)

c) 2e^(2x)

d) The derivative does not exist

Answer: a) 2e^(2x - 1)

30. What is the second derivative of f(x) = sin(2x + 1)?

a) 2cos(2x + 1)

b) cos(2x)

c) 2sin(2x)

d) The derivative does not exist

Answer: a) 2cos(2x + 1)

31. What is the second derivative of f(x) = cos(3x - 2)?

a) -3sin(3x - 2)

b) sin(3x)

c) 3cos(3x)

d) The derivative does not exist

Answer: a) -3sin(3x - 2)

32. What is the second derivative of f(x) = tan(5x + 3)?

a) 5sec^2(5x + 3)

b) sec^2(5x)

c) 5tan(5x)

d) The derivative does not exist

Answer: a) 5sec^2(5x + 3)

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33. What is the derivative of f(x) = x^3 - 4x^2 + 5x + 2?

a) 3x^2 - 8x + 5

b) 3x^2 - 8x + 2

c) x^2 - 4x + 5

d) x^2 - 4x + 2

Answer: a) 3x^2 - 8x + 5

34. What is the derivative of f(x) = sqrt(x) + ln(x)?

a) 1/(2sqrt(x)) + 1/x

b) 1/(2sqrt(x)) + ln(x)

c) 1/(2x) + 1/x

d) 1/(2x) + ln(x)

Answer: a) 1/(2sqrt(x)) + 1/x

35. What is the derivative of f(x) = e^x * sin(x)?

a) e^x * sin(x) + e^x * cos(x)

b) e^x * sin(x) + sin(x) * cos(x)

c) e^x * cos(x) + sin(x) * cos(x)

d) e^x * cos(x) + e^x * sin(x)

Answer: a) e^x * sin(x) + e^x * cos(x)

36. What is the derivative of f(x) = ln(x) / x^2?

a) (1 - 2ln(x)) / x^3

b) (1 - 2ln(x)) / x

c) (1 - 2/x) / x^3

d) (1 - 2/x) / x

Answer: a) (1 - 2ln(x)) / x^3

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37. What is the derivative of f(x) = sin(x) / cos(x)?

a) 1

b) sin(x)

c) cos(x)

d) tan(x)

Answer: d) tan(x)

38. What is the derivative of f(x) = cos(x) / sin(x)?

a) 1

b) cos(x)

c) sin(x)

d) cot(x)

Answer: d) cot(x)

39. What is the derivative of f(x) = x * sin(x^2)?

a) sin(x^2) + 2x^2 * cos(x^2)

b) sin(x^2) + 2x * cos(x^2)

c) x * cos(x^2) + 2x^2 * sin(x^2)

d) x * cos(x^2) + 2x * sin(x^2)

Answer: c) x * cos(x^2) + 2x^2 * sin(x^2)

40. What is the derivative of f(x) = (1 + x)^3?

a) 3(1 + x)^2

b) 3(1 + x)^3

c) 3(1 + x)^4

d) 3(1 + x)^2 + 1

Answer: a) 3(1 + x)^2

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41. What is the derivative of

f(x) = ln(3x - 2)?

a) 1/(3x - 2)

b) 3/(3x - 2)

c) 1/x

d) 3/x

Answer: a) 1/(3x - 2)

42. What is the derivative of f(x) = e^(2x^2 + 3x)?

a) 4xe^(2x^2 + 3x)

b) 2x^2e^(2x^2 + 3x) + 3xe^(2x^2 + 3x)

c) 2xe^(2x^2 + 3x) + 3e^(2x^2 + 3x)

d) 4x^2e^(2x^2 + 3x) + 3x^2e^(2x^2 + 3x)

Answer: b) 2x^2e^(2x^2 + 3x) + 3xe^(2x^2 + 3x)

43. What is the second derivative of f(x) = 4x^3 - 3x^2 + 2x - 1?

a) 24x - 6

b) 12x^2 - 6x + 2

c) 24x^2 - 6x + 2

d) 12x - 6

Answer: b) 12x^2 - 6x + 2

44. What is the second derivative of f(x) = e^(3x - 2)?

a) 9e^(3x - 2)

b) 6e^(3x - 2)

c) 3e^(3x - 2)

d) 0

Answer: c) 3e^(3x - 2)

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45. What is the second derivative of f(x) = sin(2x + 1)?

a) -4cos(2x + 1)

b) 2sin(2x)

c) -4sin(2x)

d) 2cos(2x)

Answer: c) -4sin(2x)

46. What is the second derivative of f(x) = cos(3x - 2)?

a) -9sin(3x - 2)

b) 3cos(3x)

c) -9cos(3x)

d) 3sin(3x)

Answer: c) -9cos(3x)

47. What is the second derivative of f(x) = tan(5x + 3)?

a) 10sec^2(5x + 3)

b) 5sec^2(5x)

c) 10tan(5x)

d) The derivative does not exist

Answer: a) 10sec^2(5x + 3)

48. What is the second derivative of f(x) = 3x^2 + 2x - 1?

a) 6

b) 6x + 2

c) 6x

d) 0

Answer: a) 6

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49. What is the second derivative of f(x) = 4x^3 - 2x^2 + 5x - 3?

a) 24x - 4

b) 24x^2 - 4x + 5

c) 24x^2 - 4x + 5

c) 24x^2 - 4x + 5

d) 12x - 4

Answer: a) 24x - 4

50. What is the second derivative of f(x) = e^(2x - 1)?

a) 4e^(2x - 1)

b) 2e^(2x)

c) 4e^(2x)

d) The derivative does not exist

Answer: c) 4e^(2x)

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