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Derivatives by Definition Lecture 25

Find the derivative of the following by definition.

1. $f(x) = 4x + 5$

2. $f(x) = x^2$

3. $f(x) = x^3$

4. $f(x) = \sqrt{x - 3}$

5. $f(x) = \dfrac{1}{2x + 1}$

6. $f(x) = \dfrac{x}{3x - 1}$

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Tangent Lines Lecture 26

Using the answers to last night's function, find the equation of the line tangent to the given function at the given point

1. $f(x) = 4x + 5$ at x = 2

2. $f(x) = x^2$ at x = 9

3. $f(x) = x^3$ at x = -3

4. $f(x) = \sqrt{x - 3}$ at x = 12

5. $f(x) = \frac{1}{2x + 1}$ at x = $\frac{1}{2}$

6. $f(x) = \frac{x}{3x - 1}$ at x = -1

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Lecture 27 Short Cuts

Find $\frac{dy}{dx}$ for the following.

1. $y = 7x + 3$

2. $y = 3x^2 - 4x + 2$

3. $y = 5x^3 - 3x^2 + 4x - 1$

4. $y = 2$

5. $y = 9x^5 + 4x^3 - 12x^2 + 2x - 37$

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

7. $y = (4x + 3)^3$

8. $y = (3x^2 + 2x)^4$

9. $y = 5(1 - x)^3$

10. $y = \frac{1}{(3x + 1)^2}$

11. $y = \sqrt{4x - 3}$

12. $y = \sqrt[3]{1 - 6x}$

13. $y = \sqrt[5]{(2x + 3)^3}$

14. $y = 5x^3 - 3x^2 + 2 - \frac{3}{x} + \frac{4}{x^3}$

15. $y = \frac{2x}{x - 3}$

16. $y = (3x - 1)^2(2x + 5)^3$

17. $y = \frac{4x + 1}{4x - 1}$

18. $y = x^4(2x + 1)^9$

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

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

22. Find all points on the graph of $y = x^3 - 3x^2 - 9x + 11$ where the tangents to the graph are horizontal.