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Quiz 1
(version for practice)

Cal I (S) (Maths 201–NYA)

1. For each of the following functions, find the derivative $f'(x)$ *using the limit definition.*
   (a) $f(x) = 5x + 7$ (b) $f(x) = \sqrt{x+1}$ (c) $f(x) = 3x^2 + 5$
   (d) $f(x) = \dfrac{3}{x-2}$ (e) $f(x) = \dfrac{1}{\sqrt{x}}$

2. For each of the following functions, find the derivative $f'(x)$ *using the derivative formulas.*
   (a) $f(x) = \sqrt[5]{x^{42}}$ (b) $f(x) = 7x - 3$ (c) $f(x) = 7\sqrt[5]{x} - \dfrac{2}{x^5}$
   (d) $f(x) = x^5 - \dfrac{2}{5x^3} + \sqrt[3]{x^4}$ (e) $f(x) = \dfrac{2x^5 - 7x^3 + 21}{15}$ (f) $f(x) = (6x^{\frac{2}{5}} - 5x^2 + \pi)(2\sqrt{x} + x^2)$
   (g) $y = \dfrac{5x^9 - \frac{1}{x} + 1}{9x^2 - 3x + 5}$ (h) $y = \dfrac{(2x^3 - 4)^9}{(5x + 3x^2 + 1)^7}$ (i) $y = \left(3x^6 - 4x^2 + 21\right)^{13}(4x - 11)^5$

3. Find the slope and the equation of the tangent line to each of the following curves at the given point.
   (a) $y = 5x^3 - 3x^2$ at $x = 1$ (b) $y = \sqrt{x} - 2x + 5$ at $(4, -1)$

4. Find the equations of the lines tangent to the curve $y = x^3 - 3x^2 - 15x + 7$ which are parallel to the straight line $9x - y + 3 = 0$.

5. Find all values of x at which the graph of the following function has a horizontal tangent line: $y = 3x^4 - 10x^3 - 9x^2 + 5$.

6. Find the values of x for which the lines tangent to the curve $y = x^3 - 3x^2 - 15x + 7$ are normal (*i.e.* at right angles) to the straight line $9x - y + 3 = 0$.