

AP Calculus AB - Power, Sum and Basic Function Derivative Rules - Worksheet

Common Core AP CALC AB 2.5, AP CALC AB 2.6, AP CALC AB 2.7 · maths-pdf.fr/en/

Name: _____ Class: _____ Date: ____/____/____

These 22 problems practice the power rule, sum and constant multiple rules, derivatives of $\sin x$, $\cos x$, e^x and $\ln x$, and tangent and normal lines (AP Calculus AB, topics 2.5, 2.6, 2.7). The early problems build the basic skill, and each one uses a different function or situation so that no two feel alike.

Later problems cover tangent and normal lines, horizontal tangents, finding unknown coefficients and real situations such as drone velocity and candle profit. Work in pencil, show every step, and check the answer key only after a full attempt.

AP Calculus AB · Common Core State Standards: **AP CALC AB 2.5, AP CALC AB 2.6, AP CALC AB 2.7**

Exercise 1 - Constant and power

Find the derivative of (a) $f(x) = 7$ and (b) $g(x) = x^5$.

Exercise 2 - Higher power

Find $\frac{d}{dx}[x^8]$.

Exercise 3 - Polynomial

Differentiate $f(x) = 4x^3 - 5x^2 + 7x - 9$.

Exercise 4 - Polynomial with a fraction

Differentiate $f(x) = 3x^4 + \frac{x^2}{2} - 6$.

Exercise 5 - Root and reciprocal

Differentiate $f(x) = \sqrt{x} + \frac{5}{x^2}$.

Exercise 6 - Simplify first

Differentiate $f(x) = \frac{x^5 - 3x^2}{x}$ by simplifying before using a rule.

Exercise 7 - Negative and fractional powers

Differentiate $f(x) = \frac{6}{x^3} - 2\sqrt[3]{x}$.

Exercise 8 - Sine and cosine

Differentiate $f(x) = 4\cos x + \frac{1}{2}\sin x + \pi x$.

Exercise 9 - Exponential and logarithm

Differentiate $f(x) = 5e^x - 4\ln x$.

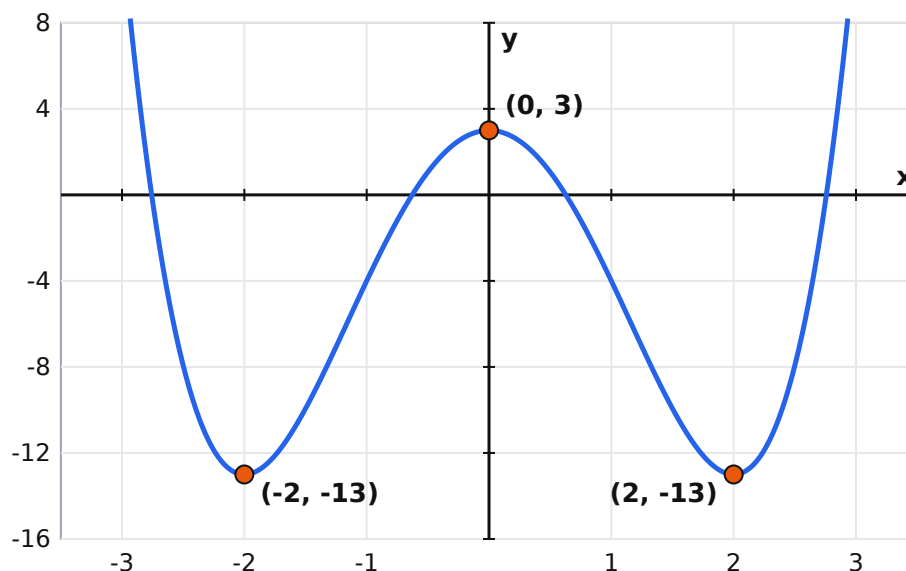
Exercise 10 - Mixed functions

Differentiate $f(x) = x^2 + 2\sin x - e^x + \pi$.

Exercise 11 - Evaluate a derivative

For $f(x) = x^3 - 2x^2 + x$, find $f'(2)$.

Exercise 12 - Horizontal tangents of a quartic



The graph of $f(x) = x^4 - 8x^2 + 3$.

Find the points where the graph of $f(x) = x^4 - 8x^2 + 3$ has a horizontal tangent line.

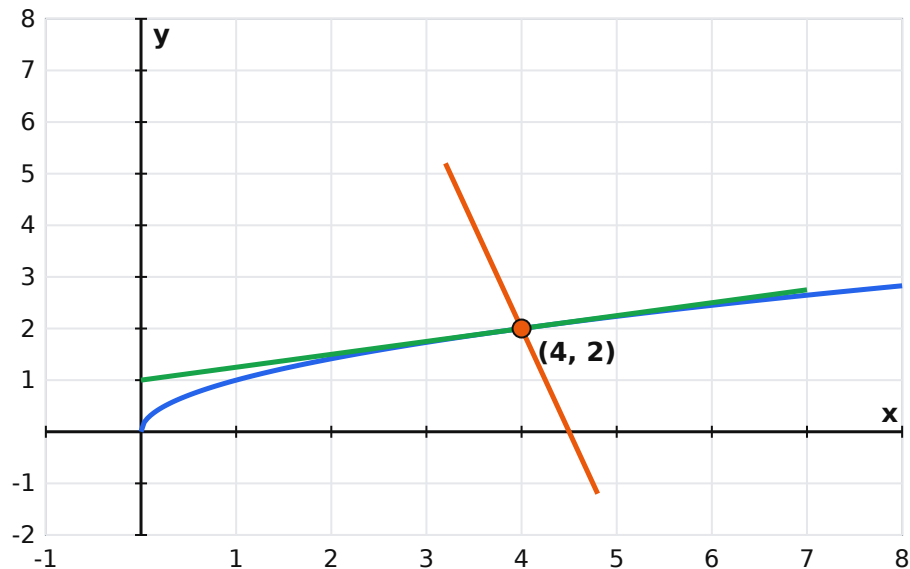
Exercise 13 - Tangent line to a parabola

Find the tangent line to $f(x) = x^2 - 6x + 5$ at $x = 4$.

Exercise 14 - Tangent line to a cubic

Find the tangent line to $f(x) = x^3$ at $x = -1$.

Exercise 15 - Normal line



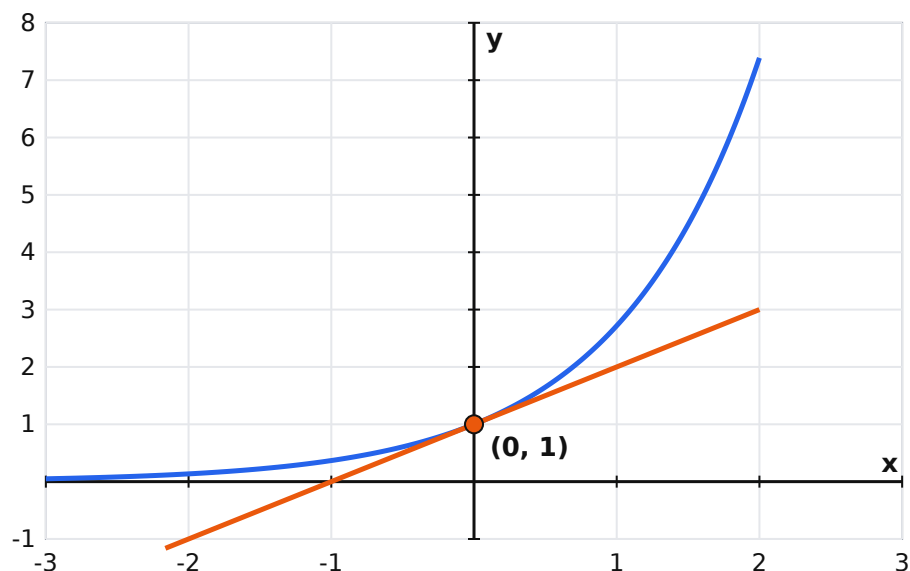
Tangent (green) and normal (orange) at (4, 2).

Find the equation of the normal line to $f(x) = \sqrt{x}$ at $x = 4$.

Exercise 16 - Parallel tangent lines

Find all points on the graph of $f(x) = x^3 - 3x$ where the tangent line is parallel to $y = 9x + 1$.

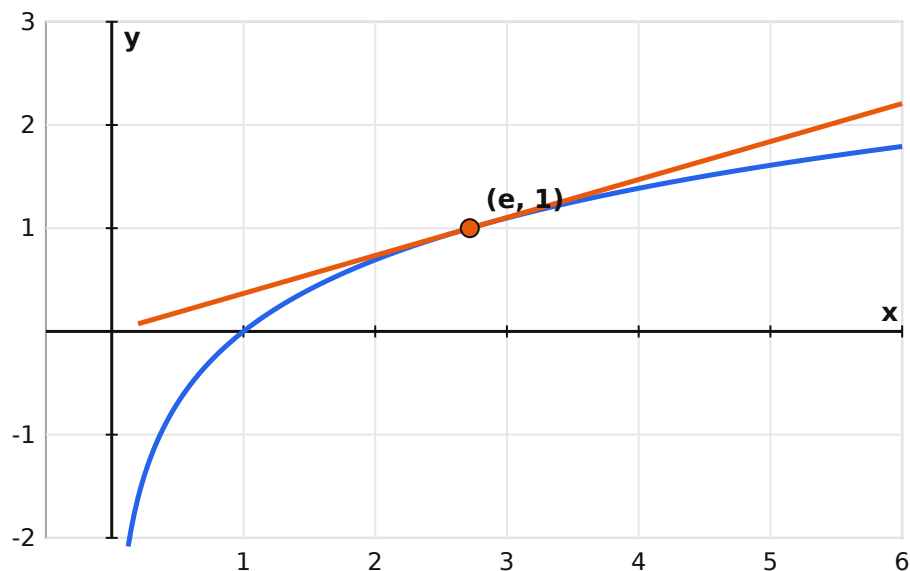
Exercise 17 - Tangent to the exponential



The tangent to e^x at $x = 0$.

Find the tangent line to $f(x) = e^x$ at $x = 0$.

Exercise 18 - Tangent to the logarithm



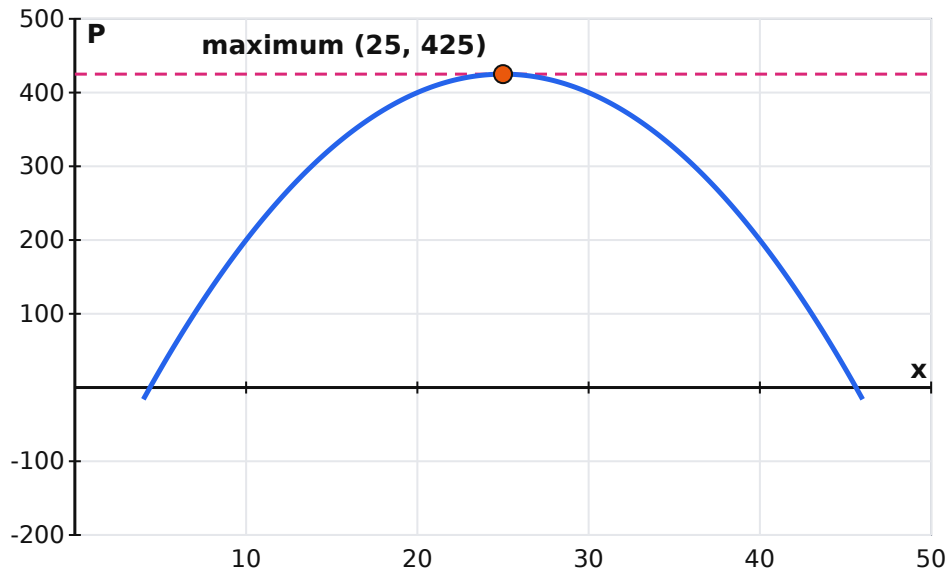
The tangent to $\ln x$ at $x = e$.

Find the tangent line to $f(x) = \ln x$ at $x = e$.

Exercise 19 - Velocity of a particle

A drone flies along a track so that its position in feet after t seconds is $s(t) = t^3 - 6t^2 + 9t$. Find its velocity and the times when it is at rest.

Exercise 20 - Maximum profit



Profit peaks at 25 items.

The weekly profit in dollars from selling x handmade candles is $P(x) = -x^2 + 50x - 200$. Find $P'(x)$ and the number of candles at which the tangent line is horizontal. What is the profit there?

Exercise 21 - Finding coefficients

The graph of $f(x) = ax^2 + bx$ passes through $(1, 3)$ with tangent slope 2 there. Find a and b .

Exercise 22 - Tangent through an outside point

For which values of a does the tangent line to $y = x^2$ at (a, a^2) pass through the point $(0, -4)$?