

(Tangent to the function)

1. Write the equation of the tangent line to the graph of $f(x) = \sqrt{2x+3} - x$ in a tangent point $T = [3; ?]$. Use this result to calculate an approximate value of $f(3.2)$. Write the normal line to the graph of a function.
2. Write the equations of the tangent and normal lines to the graph of $f(x) = e^{-x} \cos 2x$ in point $x_0 = 0$.
3. Find a tangent point, such that the tangent line of a function $f(x) = x^2 + 4x$ (in the point) is parallel to the x-axes.

Intervals of monotonicity and local extrema

Determine the intervals of monotonicity, find local extrema (and determine their types) of following functions:

1. $f(x) = 3x - x^3$
2. $f(x) = x^2 - \ln(x^2)$
3. $f(x) = x^2 e^x$

Absolute extrema

Decide if the absolute extrema (min., max.) of the following functions exist on the given intervals (I). If so, find them.

4. $f(x) = x^3 - 3x^2 - 9x + 35$, $I = \langle -4; 4 \rangle$
5. $f(x) = x^2 \ln x$, $I = \langle 1; e \rangle$
6. $f(x) = \frac{x^2+4}{x}$, $I = (0; 3)$

Asymptotes

Determine all possible asymptotes of following functions:

7. $f(x) = \frac{\ln x}{x^2-2} + 2$
8. $f(x) = \sqrt{x+x^2}$
9. $f(x) = \frac{x^3}{4-x^2}$