Taylor Polynomial

14. Derive the Taylor polynomial $T_2(x)$ (order 2) for the function e^x around 0. Using the Taylor polynomial $T_2(x)$, approximate $e^{0.12}$ and estimate the error $R_2(x)$.

15. Derive the Taylor polynomial $T_2(x)$ (order 2) for the function $\ln x$ around 1. Using the Taylor polynomial $T_2(x)$, approximate $\ln(0.95)$.

16. Derive the Taylor polynomial $T_2(x)$ (order 2) for the function $f(x) = \frac{1}{\sqrt{4+x}}$ around 0. Using the Taylor polynomial $T_2(x)$, approximate $(4.13)^{-\frac{1}{2}}$ and estimate the error $R_2(x)$.

Finding Extrema

17. Find the global maximum and global minimum of the function $f(x) = 10x\,(2 - \ln x)$ on the interval $[1, e^2]$.

18. Determine and classify the local extrema of the function

$$g(x) = \frac{(2x-1)^3}{(x+2)^2}.$$

19. The function $f(x) = \frac{x}{x^2+ax+b}$ is given. Find constants a and b such that $T(2, \frac{1}{7})$ is a local extremum.

20. Determine the domain, sign, and local extrema of the function

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

21. Let p be a line passing through the point $P(6, 3)$ in the xy-plane. Consider a right triangle formed by the line p, the positive x-axis, and the positive y-axis. Find the minimum possible area of the given right triangle.

(Hint: Notice that the solution is not the line p passing through $(0, 0)$ *because in that case, the line does not intersect the positive x-axis or the positive y-axis).*

All above math problems are taken from the following website:
`https://osebje.famnit.upr.si/~penjic/teaching.html`.
The reader can find all solutions to the given problems on the same page.