Zadatak 3. Deriviraj sljedeće funkcije:

1) $f(x) = x^3 \ln x$;

2) $f(x) = e^x + \ln x$;

3) $f(x) = e^x \ln x$;

4) $f(x) = \dfrac{\ln x}{x}$;

5) $f(x) = (x^2 - 2x + 2)e^x$;

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

Rješenje.

1) $f'(x) = 3x^2 \ln x + x^3 \cdot \dfrac{1}{x} = x^2(1 + 3\ln x) = 3x^2 \ln(ex)$;

2) $f'(x) = e^x + \dfrac{1}{x}$;

3) $f'(x) = e^x \ln x + e^x \cdot \dfrac{1}{x} = e^x\left(\dfrac{1}{x} + \ln x\right)$;

4) $f'(x) = \dfrac{\frac{1}{x} \cdot x - \ln x \cdot 1}{x^2} = \dfrac{1 - \ln x}{x^2}$;

5) $f'(x) = (2x - 2)e^x + (x^2 - 2x + 2)e^x = x^2 e^x$;

6) $f'(x) = 3x^2\left(\ln x - \dfrac{1}{3}\right) + x^3 \cdot \dfrac{1}{x} = 3x^2 \ln x - x^2 + x^2 = 3x^2 \ln x$.