Zadatak 14. Deriviraj funkcije:

1) $f(x) = 2e^{-3x}$;

2) $f(x) = \frac{1}{2}e^{2-x^2}$;

3) $f(x) = e^x + e^{-x}$;

4) $f(x) = \frac{e^{2x} - e^{-2x}}{e^x + e^{-x}}$;

5) $f(x) = \ln \frac{1}{1 - e^{2x}}$;

6) $f(x) = \ln(e^x + \sqrt{1 + e^{2x}})$;

7) $f(x) = \sin e^{x^2 - x}$;

8) $f(x) = e^x \sin x + e^{-x} \cos x$.

Rješenje. **1)** $f'(x) = (2e^{-3x})' = 2e^{-3x}(-3) = -6e^{-3x}$;

2) $f'(x) = \left(\frac{1}{2}e^{2-x^2}\right)' = \frac{1}{2}e^{2-x^2}(-2x) = -xe^{2-x^2}$;

3) $f'(x) = (e^x + e^{-x}) = e^x - e^{-x}$;

4) $f'(x) = \left(\frac{e^{2x} - e^{-2x}}{e^x + e^{-x}}\right)' = (e^x - e^{-x})' = e^x + e^{-x}$;

5) $f'(x) = \left(\ln \frac{1}{1 - e^{2x}}\right)' = (1 - e^{2x}) \cdot \left(-\frac{1}{(1 - e^{2x})^2}\right)(-e^{2x})2 = \frac{2e^{2x}}{1 - e^{2x}}$;

6) $f'(x) = [\ln(e^x + \sqrt{1 + e^{2x}})]' = \frac{1}{e^x + \sqrt{1 + e^{2x}}} \cdot \left(e^x + \frac{2e^{2x}}{2\sqrt{1 + e^{2x}}}\right) = \frac{1}{e^x + \sqrt{1 + e^{2x}}} \frac{e^x(\sqrt{1 + e^{2x}} + e^x)}{\sqrt{1 + e^{2x}}} = \frac{e^x}{\sqrt{1 + e^{2x}}}$;

7) $f'(x) = (\sin e^{x^2 - x})' = \cos e^{x^2-x} \cdot e^{x^2-x} \cdot (2x-1) = (2x-1)e^{x^2-x} \cos e^{x^2-x}$;

8) $f'(x) = (e^x \sin x + e^{-x} \cos x)' = e^x \sin x + e^x \cos x - e^{-x} \cos x - e^{-x} \sin x = (e^x - e^{-x})(\sin x + \cos x)$.