

Zadatak 6. Deriviraj funkcije:

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| 1) $f(x) = \cos^3 x$; | 2) $f(x) = 2 \operatorname{ctg} \frac{x}{3}$; |
| 3) $f(x) = \frac{1}{2} \operatorname{tg}^2 x$; | 4) $f(x) = 3 \sin^2 \frac{x}{2}$; |
| 5) $f(x) = -\cos^2\left(\frac{\pi}{2} - \frac{x}{2}\right)$; | |
| 6) $f(x) = 2 \operatorname{ctg}\left(x - \frac{\pi}{2}\right)$; | |
| 7) $f(x) = \cos^2 x - \sin^2 x$; | |
| 8) $f(x) = (\sin x + \cos x)^2$. | |

Rješenje.

- 1) $f'(x) = (\cos^3 x)' = 3 \cos^2 x (\cos x)' = 3 \cos^2 x (-\sin x) = -3 \sin x \cos^2 x$;
- 2) $f'(x) = \left(2 \operatorname{ctg} \frac{x}{3}\right)' = 2 \cdot \left(-\frac{1}{\sin^2 \frac{x}{3}}\right) \cdot \frac{1}{3} = -\frac{2}{3} \frac{1}{\sin^2 \frac{x}{3}}$;
- 3) $f'(x) = \frac{1}{2} \operatorname{tg}^2 x = \frac{1}{2} 2 \operatorname{tg} x \cdot \frac{1}{\cos^2 x} = \frac{\sin x}{\cos^3 x}$;
- 4) $f'(x) = \left(3 \sin^2 \frac{x}{2}\right)' = 3 \cdot 2 \sin \frac{x}{2} \cos \frac{x}{2} \cdot \frac{1}{2} = \frac{3}{2} \sin x$;
- 5) $f'(x) = \left[-\cos^2\left(\frac{\pi}{2} - \frac{x}{2}\right)\right]' = 2 \cos\left(\frac{\pi}{2} - \frac{x}{2}\right) \sin\left(\frac{\pi}{2} - \frac{x}{2}\right) \left(-\frac{1}{2}\right) = -\frac{1}{2} \sin(\pi - x) = -\frac{1}{2} \sin x$;
- 6) $f'(x) = \left[2 \operatorname{ctg}\left(x - \frac{\pi}{2}\right)\right]' = 2 \cdot \frac{1}{\sin^2\left(x - \frac{\pi}{2}\right)} = -\frac{2}{\cos^2 x}$;
- 7) $f'(x) = [\cos^2 x - \sin^2 x]' = (\cos 2x)' = -2 \sin 2x$;
- 8) $f'(x) = [(\sin x + \cos x)^2]' = (\sin^2 x + \cos^2 x + \sin 2x)' = (1 + \sin 2x)' = 2 \cos 2x$.