Zadatak 6. Odredi intervale monotonosti funkcija:

1) $f(x) = 3x^4 - 4x^3 - 36x^2 + 5$;

2) $f(x) = 4 + 6x - 9x^2 - 20x^3$.

Rješenje. **1)** $f'(x) = 12x^3 - 12x^2 - 72x = 12x(x^2 - x - 6) = 12x(x-3)(x+2)$. Stacionarne točke su 0, 3 i -2. $x(x-3)(x+2) > 0 \implies x \in \langle -2, 0\rangle \cup \langle 3, +\infty\rangle$; $x(x-3)(x+2) < 0 \implies x \in \langle -\infty, -2\rangle \cup \langle 0, 3\rangle$. Funkcija je padajuća na $\langle \infty, -2\rangle \cup \langle 0, 3\rangle$, a rastuća na $\langle -2, 0\rangle \cup \langle 3, +\infty\rangle$.

2) $f'(x) = 6 - 18x - 60x^2 = -6(10x^2 + 3x - 1) = -6(10x^2 + 5x - 2x - 1) = -6(5x-1)(2x+1)$. Stacionarne točke su $\frac{1}{5}$ i $-\frac{1}{2}$. $(5x-1)(2x+1) < 0 \implies x \in \left\langle -\frac{1}{2}, \frac{1}{5}\right\rangle$; $(5x-1)(2x+1) > 0 \implies x \in \left\langle -\infty, -\frac{1}{2}\right\rangle \cup \left\langle \frac{1}{5}, +\infty\right\rangle$. Funkcija je padajuća na $\mathbf{R} \setminus \left[-\frac{1}{2}, \frac{1}{5}\right]$, a rastuća na $\left\langle -\frac{1}{2}, \frac{1}{5}\right\rangle$.