Ασκηση 2

α) $\beta f^T x + 3 \overset{AM}{\Rightarrow} 7 f^T x + 3$

$(7 f^T x + 3)' = 7f$

β) $r\|x\|^2 + 2f^T x + x^T(D + \beta I)f + \delta f^T D^T f$

$\overset{AM}{\Rightarrow} \left(6\|x\|^2 + 2f^T x + x^T(D + 7I)f + 5f^T D^T f\right) =$

$= \left(6 x x^T + 2f^T x + x^T(D + 7I)f + 5f^T D^T f\right)' =$

$= 6 \cdot 2 \cdot x + 2f + (D + 7I)f + 0 =$

$= 12x + 2f + (D + 7I)f$

γ) $g'(x) = 0 \iff \left(\frac{1}{2} x^T (D^T D + 2I)x + f^T x + 10\right)'$

$= \frac{1}{2} \cdot 2 (D^T D + 2I)x + f + 0 \overset{!}{=} 0 \Rightarrow (D^T D + 2I)f$

$\Rightarrow x = -\frac{f}{(D^T D + 2I)} = -(D^T D + 2I)f$