

α) Είναι

$$\boxed{f'(x)} = 2\alpha x - \frac{\beta}{x^2}$$

$$\boxed{f''(x)} = 2\alpha + \frac{\beta}{x^3} \quad 2 \cancel{x} = 2\alpha + \frac{2\beta}{x^3}$$

Οπότε

$$\boxed{x^2 f''(x)} = x^2 \left(2\alpha + \frac{2\beta}{x^3} \right) = 2\alpha x^2 + \cancel{x^2} \frac{2\beta}{x^{\cancel{2}}} = 2 \left(\alpha x^2 + \frac{\beta}{x} \right) = \boxed{2f(x)}$$

β) Είναι

$$f(2) = -3 \Rightarrow \alpha \cdot 2^2 + \frac{\beta}{2} = -3 \Rightarrow \boxed{8\alpha + \beta = -6} \quad (1)$$

$$f'(1) = -4 \Rightarrow 2\alpha \cdot 1 - \frac{\beta}{1^2} = -4 \Rightarrow \boxed{2\alpha - \beta = -4} \quad (2)$$

Λύνοντας το σύστημα των (1) και (2) βρίσκουμε $\boxed{\alpha = -1}$ και $\boxed{\beta = 2}$