10.2   1) $\|x\|^2 = \left(\sqrt{x_1^2 + \ldots + x_n^2}\right)^2 = x_1^2 + \ldots + x_n^2 = x \cdot x$

2) $\|x\| = 0 \iff \|x\|^2 = 0 \iff x \cdot x = 0 \iff x = 0$

3) $\|\alpha\,x\| = \left\|\alpha\,(x_1\,;\,\ldots\,;\,x_n)\right\|$
$= \left\|(\alpha\,x_1\,;\,\ldots\,;\,\alpha\,x_n)\right\|$
$= \sqrt{(\alpha\,x_1)^2 + \ldots + (\alpha\,x_n)^2}$
$= \sqrt{\alpha^2\,x_1^2 + \ldots + \alpha^2\,x_n^2}$
$= \sqrt{\alpha^2\,(x_1^2 + \ldots + x_n^2)}$
$= \sqrt{\alpha^2}\,\sqrt{x_1^2 + \ldots + x_n^2}$
$= |\alpha|\,\|x\|$