1. False. $[0, 1]$ is not a a rational number, so it is not in $\mathbb{Q}$.

2. True.

3. (a) $(f/g)(x) = \frac{(x-5)}{(x-5)(x+7)^2}$. This is not defined when $x + 7 = 0$ or $x - 5 = 0$, when $x = -7$ or $x = 5$. Thus the domain is $\mathbb{R}\backslash\{-7, 5\}$. (It's tempting, but incorrect, to cancel the $(x - 5)$ factors in the numerator and denominator. At $x = 5$, the product function is the product of $\infty$ with 0, which is not defined.)

   (b) $(f \cdot g)(x) = \frac{(x+7)(x-5)^5}{x+7}$. This is not defined when $x + 7 = 0$ when $x = -7$, so the domain is $\mathbb{R}\backslash\{-7\}$.