

1. False. If a function $f : D \rightarrow R$ is not surjective, then there is some $y \in R$ with no $x \in D$ such that $f(x) = y$. Restricting the domain will not create an x with $f(x) = y$, so we cannot restrict the domain to make f surjective.

2. False. $\sin(x)$ from \mathbb{R} to \mathbb{R} does not pass the horizontal line test.

3. (a)

$$\lim_{x \rightarrow \infty} \frac{2x + 7}{3x + 12} = \lim_{x \rightarrow \infty} \frac{\frac{2x+7}{x}}{\frac{3x+12}{x}} = \lim_{x \rightarrow \infty} \frac{2 + \frac{7}{x}}{3 + \frac{12}{x}} = \frac{2 + 0}{3 + 0} = \frac{2}{3}$$

(If we tried to plug in first, we would get $\frac{\infty}{\infty}$, an indeterminate form.)

(b) $\tan(x + \frac{\pi}{2})$ has a vertical asymptote at $x = \pi$, since $\tan(x)$ has a vertical asymptote at $x = \frac{3\pi}{2}$. Thus, the limit does not exist (DNE, \nexists).