

15.

$$\begin{aligned}
 a) \lim_{x \rightarrow 0} (\pi + x) &= \\
 &= \cancel{\pi} \overset{0}{\pi} \cos x + \sin x \underset{-1}{\cos \pi} \\
 &= \underline{\underline{-\sin x}}
 \end{aligned}$$

$$\begin{aligned}
 b) \tan(2\pi - x) &= \frac{\cancel{\tan 2\pi} \overset{0}{\cos x}}{1 + \cancel{\tan 2\pi} \tan x} \\
 &= \frac{-\tan x}{1} = \underline{\underline{-\tan x}}
 \end{aligned}$$

$$\begin{aligned}
 c) \cos\left(\frac{3\pi}{2} + x\right) &= \\
 &= \cancel{\cos \frac{3\pi}{2}} \overset{0}{\cos x} - \sin \frac{3\pi}{2} \sin x \\
 &= \underline{\underline{\sin x}}
 \end{aligned}$$

$$\begin{aligned}
 d) \sin\left(\frac{3\pi}{2} - x\right) &= \\
 &= \sin \frac{3\pi}{2} \cos x - \cancel{\sin x} \overset{0}{\cos \frac{3\pi}{2}} \\
 &= -1 \cos x = \underline{\underline{-\cos x}}
 \end{aligned}$$

$$\begin{aligned}
 e) \cos\left(\frac{\pi}{2} + x\right) &= \\
 &= \cancel{\cos \frac{\pi}{2}} \overset{0}{\cos x} - \sin \frac{\pi}{2} \sin x \\
 &= \underline{\underline{-\sin x}}
 \end{aligned}$$

$$\begin{aligned}
 f) \lim_{x \rightarrow 0} (x - \pi) &= \\
 &= \lim_{x \rightarrow 0} \cos \pi - \cancel{\sin \pi} \overset{0}{\cos x} \\
 &= \underline{\underline{-\sin x}}
 \end{aligned}$$

$$\begin{aligned}
 g) -\tan(-x - \pi) &= \\
 &= -(-)\tan(x + \pi) \\
 &= \tan(x + \pi) \\
 &= \frac{\tan x + \cancel{\tan \pi} \overset{0}{1}}{1 - \tan x \tan \pi} \\
 &= \underline{\underline{\tan x}}
 \end{aligned}$$

16.

Escreva

$$\begin{cases}
 x = \frac{x+y}{2} + \frac{x-y}{2} \\
 y = \frac{x+y}{2} - \frac{x-y}{2}
 \end{cases}$$

Então

a) e b)

$$\begin{aligned}
 \lim x &= \lim \left(\frac{x+y}{2} + \frac{x-y}{2} \right) \\
 &= \lim \frac{x+y}{2} \cos \frac{x-y}{2} + \lim \frac{x-y}{2} \cos \frac{x+y}{2}
 \end{aligned}$$

$$\begin{aligned}
 \lim y &= \lim \left(\frac{x+y}{2} - \frac{x-y}{2} \right) \\
 &= \lim \frac{x+y}{2} \cos \frac{x-y}{2} - \lim \frac{x-y}{2} \cos \frac{x+y}{2}
 \end{aligned}$$