1) $\lim_{\theta \to \frac{\pi}{2}} \theta \sin \theta$

$=$

$\theta = \frac{\pi}{2}$

$\frac{\pi}{2} \sin \frac{\pi}{2}$

$1 \cdot \frac{\pi}{2} = \frac{\pi}{2}$

$T \to 0$ (

↓ $T^2 + T = T(T+1)$

2. $\lim_{u \to 2} 2\left(\frac{\sqrt{4u+1} - 3}{u-2}\right)$

rationalize:

[redacted]

$\frac{4}{\sqrt{4u+1} + 3}$

$u = 2$

$\frac{4}{\sqrt{4 \cdot 2 + 1} + 3}$

↓

$\frac{2}{3}$

3) $\lim_{x \to 0} \left(\frac{1}{x} + \frac{1}{|x|}\right)$

When $x \to 0$ x = positive so $|x| = x$

$\lim_{x \to 0^+} \left(\frac{1}{x} - \frac{1}{x}\right) = 0$

$\lim_{x \to 0^+} (0) = 0$

→

3 cont.

$\frac{1}{x} - \frac{1}{x}$ Fraction rule $= \frac{0x}{-6} = -\frac{0}{6}$

$\frac{1}{x} - \left(-\frac{1}{x}\right) = \frac{1}{x} + \frac{1}{x}$

$2 \cdot \frac{1}{x} = \frac{1 \cdot 2}{x} = \frac{2}{x}$

$\lim_{x \to 0^-} \left(\frac{2}{x}\right)$

Answer: Diverges

Answer to 4: 0

4) $\lim_{x \to 0} x^4 \left(\cos\left(\frac{1+\sqrt{x}}{\sin x}\right)\right)$

↓

Squeez theorem

↓

$\lim_{x \to 0} \left(x^4 \left(\cos \frac{1+\sqrt{x}}{\sin x}\right)\right)$

$-1 \leq \cos\left(\frac{1+\sqrt{x}}{\sin x}\right) \leq 1$

$\lim_{x \to 0} \left(x^4(-1)\right) \leq \lim_{x \to 0} \left(x^4 \cos\left(\frac{1+\sqrt{}}{\sin x}\right)\right)$

$\leq$

$\lim_{x \to 0} \left(x^4 \cdot 1\right)$

Plug in 0 for x = 0

$\lim_{x \to 0} \left(x^4 \cdot 1\right) = 0$ Plug in $x=0$ so $=0$

5) $\lim_{x \to 0} \frac{\sin 3x \sin 5x}{x^2}$

$$\frac{0\left(\cos(3x)\cdot 3\sin(5x) + \cos(5x)\cdot 5\sin(3x)\right)}{2}$$

Plug in 0 for x

$$= \frac{30}{2} = 15$$

6) $f(x) = x - \cos x$ is Continuous for all real numbers
in particular $[0,1]$

$f(0) = 0 - 1 \rightarrow = -1$

< 0 and $f(1) = 1 - \cos(1)$

> 0

Using I.V.T. $x - \cos x = 0$ has a root in $(0,1)$

7)

$C = 1$

8) $\lim_{T \to 0} \left(\frac{1}{T} - \frac{1}{T^2+1} \right)$

$\frac{1}{T} - \frac{1}{T^2+T}$ factor $T^2+T = T(T+1)$

$\frac{1}{T(T+1)}$

LCM $T(T+1)$ → $\frac{1}{T} = \frac{1 \cdot (T+1)}{T(T+1)} = \frac{T+1}{T(T+1)}$

$\frac{T+1}{T(T+1)} - \frac{1}{T(T+1)}$ Combine

$\frac{T+1-1}{T(T+1)} = \frac{1}{T+1}$ Plug in 0 $= \frac{1}{0+1} = 1$

answer = 1

9.

10) $\lim_{x \to 0} \left(\cos\left(x + \sin(x)\right)\right)$

$x = 0$

$\cos(0 + \sin(0))$

Simplify

$\sin(0) = 0$

$\cos(0 + 0)$

0 to 0

$\cos 0 = 1$

$= 1$

end cos 1