Limits:

Graphically
Numerically
Analytically(factoring,rationalizing,simplifying, special cases)

Continuity (removable, nonremovable, definition)

IVT

$$\lim_{x \to c^-} f(x) = \lim_{x \to c^+} f(x) = f(c)$$

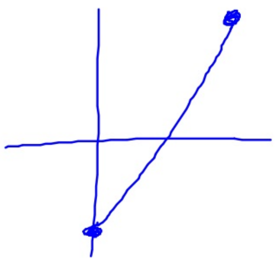
$f(x) = x^2 - x - 12 \qquad [0, 6]$

prove there is a zero.

$f(0) = -12$

$f(6) = 36 - 6 - 12$

$= 18$



Since f(x) is continuous on [0,6] and f(0) < 0 < f(6), by IVT there must exist a value c such that f(c) = 0

$0 = x^2 - x - 12$

$0 = (x-4)(x+3)$

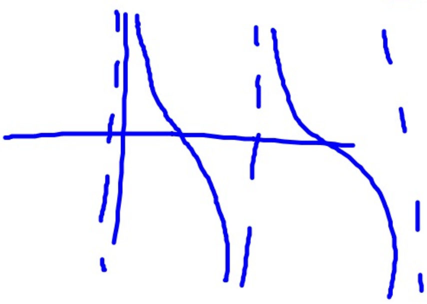
$x = 4, \cancel{-3}$

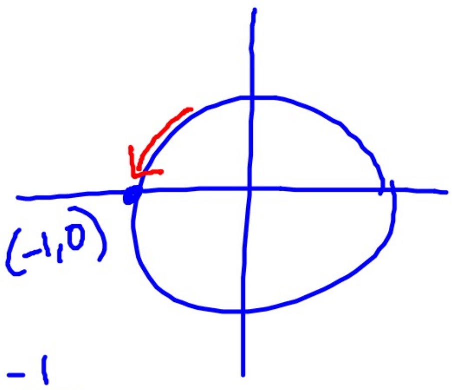
$\boxed{c = 4}$

7

$$\lim_{x \to \pi^-} 5\cot x$$

∞ or $-\infty$





$$\frac{-1}{0}$$

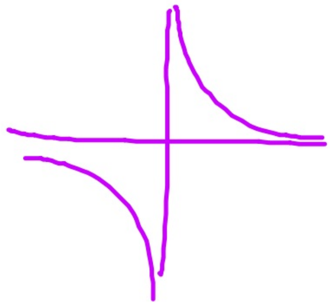
8) $$\lim_{x\to 0^-}\left(3x+2-\frac{1}{x}\right)$$

$$0+2-\lim_{x\to 0^-}\frac{1}{x}$$

$$0+2-(-\infty)$$

$$2+\infty$$

$$\infty$$



$$\frac{1}{-.0001}$$

$$\frac{1}{-\frac{1}{10000}}$$

$$1\cdot\left(-\frac{10000}{1}\right)$$

$$-10000$$

$$-\infty$$

Review WS

8 $$\lim_{x \to 0} \frac{\sqrt{x+1}-1}{x} \cdot \frac{(\sqrt{x+1}+1)}{(\sqrt{x+1}+1)}$$

$$\lim_{x \to 0} \frac{x+1-1}{x(\sqrt{x+1}+1)}$$

$$\lim_{x \to 0} \frac{1}{\sqrt{x+1}+1} = \frac{1}{2}$$