#1 $\lim_{A \to 0} \frac{\sqrt{1+A} - 1}{A} \cdot \frac{\sqrt{1+A} + 1}{\sqrt{1+A} + 1}$

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

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

$= \frac{1}{2}$

#2 $\lim_{x \to -3} \frac{x^3+27}{x+3}$

$= \lim_{x \to -3} \frac{(x+3)(x^2-3x+9)}{x+3}$

$= \lim_{x \to -3} x^2 - 3x + 9$

$= 27$

#3 $\lim_{x \to -2} \frac{x^2-4}{x^3+8}$

$= \lim_{x \to -2} \frac{(x-2)(x+2)}{(x+2)(x^2-2x+4)}$

$= \lim_{x \to -2} \frac{x-2}{x^2-2x+4}$

$= \frac{-4}{12}$

$= \frac{-1}{3}$

#4 $\lim_{k \to 0^+} 5 - \left(\frac{1}{k}\right)^2$

$\approx 5 - \frac{1}{(.000001)^2}$

$= -\infty$

#5 $\lim_{g \to 0} \frac{\sin 7g}{14g}$

$= \frac{1}{2}$

#6 $\lim_{J \to 2} \frac{\sqrt{2J+3} - \sqrt{7}}{J-2} \cdot \frac{\sqrt{2J+3} + \sqrt{7}}{\sqrt{2J+3} + \sqrt{7}}$

$= \lim_{J \to 2} \frac{2J+3-7}{(J-2)(\sqrt{2J+3} + \sqrt{7})}$

$= \lim_{J \to 2} \frac{2J-4}{(J-2)(\sqrt{2J+3} + \sqrt{7})}$

$= \lim_{J \to 2} \frac{2(J-2)}{(J-2)(\sqrt{2J+3} + \sqrt{7})}$

$= \frac{2}{2\sqrt{7}}$

$= \frac{1}{\sqrt{7}}$

$= \frac{\sqrt{7}}{7}$

#7 $\lim_{M \to \infty} 12^{\frac{1}{M}}$

$= \lim_{M \to \infty} 12^{\frac{1}{9 \text{ TRILLION}}}$

$= 12^0 = 1$

#8 $\lim_{p \to -\infty} \left(\frac{1}{11}\right)^p$

$= \lim_{p \to -\infty} (11)^{-p}$

$= \infty$

#9 $\lim_{x \to -7} (x+6)^{1997}$

$= (-1)^{1997}$

$= -1$

#10 $\lim_{y \to -6} \frac{y^2 - 36}{y+6}$

$= \lim_{y \to -6} \frac{(y-6)(y+6)}{y+6}$

$= -6 - 6$

$= -12$

#11

$$\lim_{D \to -3} \frac{D^2 + 7D + 12}{D+3}$$

$$= \lim_{D \to -3} \frac{(D+3)(D+4)}{D+3}$$

$$= -3 + 4$$

$$= 1$$

#12

$$\lim_{R \to 0} \frac{\cos 2R \ \tan 2R}{R}$$

$$= \lim_{R \to 0} \frac{\cos 2R \cdot \frac{\sin 2R}{\cos 2R}}{R}$$

$$= \lim_{R \to 0} \frac{\sin 2R}{R}$$

$$= 2$$

#13

$$\lim_{\theta \to \pi/4} \frac{1 - \tan \theta}{\sin \theta - \cos \theta}$$

$$= \lim_{\theta \to \pi/4} \frac{\frac{\cos \theta}{\cos \theta} - \frac{\sin \theta}{\cos \theta}}{\sin \theta - \cos \theta}$$

$$= \lim_{\theta \to \pi/4} \frac{\frac{-1(\sin \theta - \cos \theta)}{\cos \theta}}{\sin \theta - \cos \theta}$$

$$= \lim_{\theta \to \pi/4} \frac{-1}{\cos \theta} = \frac{-1}{\frac{\sqrt{2}}{2}} = \frac{-2}{\sqrt{2}} = \frac{-2\sqrt{2}}{2}$$

$$= -\sqrt{2}$$

(A) $\lim_{\theta \to 0} \theta^3 \cot\theta \csc\theta$

$= \lim_{\theta \to 0} \theta^3 \frac{\cos\theta}{\sin\theta} \cdot \frac{1}{\sin\theta}$

$= \lim_{\theta \to 0} \frac{\theta}{\sin\theta} \cdot \frac{\theta}{\sin\theta} \cdot \theta \cdot \cos\theta$

$= 1 \cdot 1 \cdot 0 \cdot 1$

$= 0$

(B) $\lim_{H \to 0} \frac{\sec 2H \tan 2H}{H}$

$= \lim_{H \to 0} \frac{1}{\cos 2H} \cdot \frac{\sin 2H}{\cos 2H} \cdot \frac{1}{H}$

$= \lim_{H \to 0} \frac{1}{(\cos 2H)^2} \cdot \frac{\sin 2H}{H}$

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

$= 2$

DFN <u>LIMIT</u> - LET f BE A FUNCTION DEFINED AT EVERY POINT ON SOME INTERVAL CONTAINING a EXCEPT POSSIBLY AT a ITSELF

IF THERE EXISTS L SUCH THAT

$\lim_{x \to a} f(x) = L$ FROM BOTH THE RIGHT & LEFT HAND SIDES

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

THEN WE SAY THE LIMIT EXISTS

DFN <u>CONTINUOUS</u> - $f(x)$ IS CONTINUOUS IF FOR EVERY VALUE

$c \in (a,b)$

THERE EXISTS K SUCH THAT

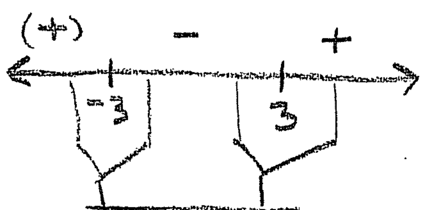
$$\lim_{x \to c^+} f(x) = \lim_{x \to c^-} f(x) = f(c) = K$$

EXPLAIN THE INTERMEDIATE VALUE THEOREM AS IT PERTAINS TO SOLVING EQUATIONS

THIS IS THE REASON FOR DESCARTES RULE OF SIGNS WORKING TO DETERMINE ROOTS

E.g. $y = x^2 - 9$

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



THERE MUST BE ZERO SINCE ON EITHER SIDE THERE ARE OPPOSITE SIGNS