Lista CALC I $\rightarrow$ Semana 11

a) $\lim_{x\to 3} \frac{x^2-9}{x-3} \rightarrow \frac{3^2-9}{3-3} = \frac{9-9}{3-3} = \frac{0}{0}$

$\rightarrow \lim_{x\to 3} \frac{\cancel{(x-3)}(x+3)}{\cancel{x-3}} = x+3$
$3+3 = 6$

b) $\lim_{x\to 5} \frac{5-x}{25-x^2} \rightarrow \frac{5-5}{25-5^2} = \frac{0}{0}$

$\rightarrow \lim_{x\to 5} \frac{\cancel{5-x}}{\cancel{(5-x)}(5+x)} \rightarrow \frac{1}{5+5} = \frac{1}{10}$

c) $\lim_{x\to 0} \frac{x^3}{2x^2-x} \rightarrow \frac{0^3}{2.0^2-0} = \frac{0}{0}$

$\rightarrow \lim_{x\to 0} \frac{\cancel{x}.x^2}{\cancel{x}(2x-1} \rightarrow \frac{x^2}{2x-1} = \frac{0^2}{2.0-1} = \frac{0}{1} = 0$

d) $\lim_{x\to 2} \frac{x^3-8}{x-2} \rightarrow \frac{2^3-8}{2-2} = \frac{8-8}{0} = \frac{0}{0}$

$\rightarrow \lim_{x\to 2} \frac{(x^2+2x+4)\cancel{(x-2)}}{\cancel{x-2}} \rightarrow 2^2+2.2+4$
$4+4+4 = 12$

e) $\lim_{x\to 1} \frac{x^2-4.x+3}{x^3-1} \rightarrow \frac{1^2-4.1+3}{1^3-1} = \frac{1-4+3}{1-1} = \frac{0}{0}$

$\rightarrow \lim_{x\to 1} \frac{(x-3)\cancel{(x-1)}}{\cancel{(x-1)}(x^2+x+1)} \rightarrow \frac{x-3}{x^2+x+1} = \frac{1-3}{1+1+1} = \frac{-2}{3}$

f) $\lim_{x\to -1} \frac{x^3+3x^2-x-3}{x^3-x^2+2} \rightarrow \frac{(-1)^3+3(-1)^2-(-1)-3}{(-1)^3-(-1)^2+2} = \frac{-1+3+1-3}{-1+1+2} = \frac{0}{0}$

$\rightarrow \lim_{x\to -1} \frac{\cancel{(x+1)}(x^2+2x-3)}{\cancel{(x+1)}(x^2-2x+2)} = \frac{x^2+2x-3}{x^2-2x+2} = \frac{(-1)^2+2.(-1)-3}{(-1)^2-2(-1)+2} = \frac{1-2-3}{1+2+2} = \frac{-4}{5}$

g) $\lim_{x\to 1} \frac{x^3-3x^2+6x-4}{x^3-4x^2+8x-5} \rightarrow \frac{1^3-3.1^2+6.1-4}{1^3-4.1^2+8.1-5} = \frac{1-3+6-4}{1-4+8-5} = \frac{0}{0}$

$\rightarrow \lim_{x\to 1} \frac{\cancel{(x-1)}(x^2-2x+4)}{\cancel{(x-1)}(x^2-3x+5)} \rightarrow \frac{x^2-2x+4}{x^2-3x+5} = \frac{1^2-2.1+4}{1^2-3.1+5} = \frac{1-2+4}{1-3+5} = \frac{3}{3} = 1$

h) $\lim_{x\to 1} \frac{x^3-3x+2}{x^4-4x+3} \rightarrow \frac{1^3-3.1+2}{1^4-4.1+3} = \frac{1-3+2}{1-4+3} = \frac{0}{0}$

$\rightarrow \lim_{x\to 1} \frac{\cancel{(x-1)^2}(x+2)}{\cancel{(x-1)^2}(x^2+2x+3)} \rightarrow \frac{x+2}{(x^2+2x+3)} \rightarrow \frac{1+2}{1^2+2.1+3} \rightarrow \frac{3}{1+2+3} \rightarrow \frac{3}{6} \rightarrow \frac{1}{2}$

i) $\lim_{x\to -2} \frac{x^4+2x^3-5x^2-12x-4}{2x^4+7x^3+2x^2-12x-8} \rightarrow \frac{(-2)^4+2.(-2)^3-5.(-2)^2-12(-2)-4}{2.(-2)^4+7.(-2)^3+2.(-2)^2-12(-2)-8} \rightarrow \frac{16-16-20+24-4}{32-56+8+24-8} = \frac{0}{0}$

$\lim_{x\to -2} \frac{12x^2+12x-10}{24x^2+42x+4} = \frac{12.(-2)^2+12(-2)-10}{24.(-2)^2+42.(-2)+4} = \frac{48-24-10}{96-84+4} = \frac{14}{16} = \frac{7}{8}$

j) $\lim_{x\to 0} \frac{\sqrt{1-2x-x^2}-1}{x} \to \frac{\sqrt{1-2.0-0^2}-1}{0} = \frac{\sqrt{1-0-0}-1}{0} = \frac{0}{0}$

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

$\lim_{x\to 0} \frac{1-2x-x^2-1}{x\sqrt{1-2x-x^2}+1} \to \frac{\cancel{x}(-2-x)}{\cancel{x}\sqrt{1-2x-x^2}+1} \to \frac{-2-x}{\sqrt{1-2x-x^2}+1} \to \frac{-2.0}{\sqrt{1.2.0-0^2}+1} \to \frac{-2}{2} = -1$

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

$\to \lim_{x\to 0} \frac{\sqrt{1+x}-\sqrt{1+x}}{x} \cdot \frac{(\sqrt{1+x}-\sqrt{1+x})}{\sqrt{1+x}+\sqrt{1+x}} \to \frac{1+x-1+x}{x(\sqrt{1+x}+\sqrt{1+x})} \to \frac{2\cancel{x}}{\cancel{x}(\sqrt{1+x}-\sqrt{1+x})} = \frac{2}{\sqrt{1+x}-\sqrt{1+x}} = \frac{2}{1+1} = 1$

l) $\lim_{x\to 1} \frac{\sqrt{2x}-\sqrt{x+1}}{x-1} \to \frac{\sqrt{2.1}-\sqrt{1+1}}{1-1} = \frac{\sqrt{2}-\sqrt{2}}{0} = \frac{0}{0}$

$\to \lim_{x\to 1} \frac{\sqrt{2x}-\sqrt{x+1}}{x-1} \cdot \frac{\sqrt{2x}+\sqrt{x+1}}{\sqrt{2x}+\sqrt{x+1}} \to \frac{2x-(x+1)}{(x-1)(\sqrt{2x}+\sqrt{x+1})} = \frac{\cancel{x-1}}{\cancel{(x-1)}(\sqrt{2x}+\sqrt{x+1})} = \frac{1}{\sqrt{2x}+\sqrt{x+1}} =$

$\to \frac{1}{\sqrt{2}+\sqrt{2}} = \frac{1}{2\sqrt{2}}$

m) $\lim_{x\to 2} \frac{x^2-4}{\sqrt{x+2}-\sqrt{3x-2}} = \frac{2^2-4}{\sqrt{2+2}-\sqrt{3.2-2}} = \frac{0}{0}$

$\to \lim_{x\to 2} \frac{x^2-4}{\sqrt{x+2}-\sqrt{3x-2}} \cdot \frac{\sqrt{x+2}+\sqrt{3x-2}}{\sqrt{x+2}+\sqrt{3x-2}} \to \frac{(x^2-4)(\sqrt{x+2}+\sqrt{3x-2})}{(x+2)-(3x-2)} = \frac{(x^2-4)(\sqrt{x+2}+\sqrt{3x-2})}{-2x+4}$

$\to \lim_{x\to 2} \frac{(x-2)(x+2).(\sqrt{x+2}+\sqrt{3x-2})}{-2(x-2)} = -\frac{(x+2)(\sqrt{x+2}+\sqrt{3x-2})}{2} = -\frac{(2+2)(\sqrt{2+2}+\sqrt{3.2-2})}{2}$

$\to -\frac{4.(\sqrt{4}+\sqrt{4})}{2} = -2(\sqrt{4}+\sqrt{4}) = -2(2+2) = -2.4 = -8$

n) $\lim_{x\to 1} \frac{\sqrt{x^2-3x+3}-\sqrt{x^2+3x-3}}{x^2-3x+2} \cdot \frac{\sqrt{x^2-3x+3}+\sqrt{x^2+3x-3}}{\sqrt{x^2-3x+3}+\sqrt{x^2+3x-3}} = \frac{x^2-3x+3-x^2-3x+3}{(x-2)(x-1).(\sqrt{x^2-3x+3}+\sqrt{x^2+3x-3})}$

$\to \lim_{x\to 1} = \frac{-6x+6}{(x-2)(x-1).(\sqrt{x^2-3x+3}+\sqrt{x^2+3x-3})} = \frac{-6(x-1)}{(x-2)\cancel{(x-1)}.(\sqrt{x^2-3x+3}+\sqrt{x^2+3x-3})}$

$\to \lim_{x\to 1} \frac{-6}{(x-2)(\sqrt{x^2-3x+3}+\sqrt{x^2+3x-3})} = \frac{-6}{(1-2)(\sqrt{1^2-3.1+3}+\sqrt{1^2+3.1-3})}$

$\to \frac{-6}{-1(\sqrt{1-3+3}+\sqrt{1+3-3})} = \frac{-6}{-1(\sqrt{1}+\sqrt{1})} = \frac{-6}{-2} = 3$