Name: [1 pt]

Problem 1. Evaluate the limit
$$\lim_{x\to 2} \frac{x^2 - 3x + 2}{x^2 - 4}.$$
[5 pts]

D.S. $\frac{2^2 - 3(2) + 2}{2^2 - 4} = \frac{4 - 6 + 2}{4 - 4} = \frac{0}{0}$

$L = \lim_{x \to 2} \frac{x^2 - 3x + 2}{x^2 - 4}$

$x^2 - 3x + 2 = \underbrace{x^2 - x}\ \underbrace{-2x + 2}$

$= x(x-1) - 2(x-1) = (x-1)(x-2)$

$x^2 - 4 = (x-2)(x+2)$

$\Rightarrow L = \lim_{x\to 2} \frac{(x-1)\cancel{(x-2)}}{\cancel{(x-2)}(x+2)} = \lim_{x \to 2} \frac{x-1}{x+2} = \frac{2-1}{2+2} = \frac{1}{4}$

Problem 2. Use the four step process to find derivative of $f(x) = 1 - x^2$. [5 pts]

Step 1 : $f(x+h) = 1 - (x+h)^2 = 1 - (x^2 + 2xh + h^2)$

$= 1 - x^2 - 2xh - h^2$

Step 2 : $f(x+h) - f(x) = (1 - x^2 - 2xh - h^2) - (1 - x^2)$

$= \cancel{1} - \cancel{x^2} - 2xh - h^2 - \cancel{1} + \cancel{x^2}$

$= -2xh - h^2$

Step 3 : $\frac{f(x+h) - f(x)}{h} = \frac{-2xh - h^2}{h} = \frac{\cancel{h}(-2x - h)}{\cancel{h}}$

$= -2x - h$

Step 4 : $f'(x) = \lim_{h \to 0} (-2x - h) = -2x - 0$

$= -2x$