① $\lim_{x\to 3} \dfrac{3-x}{x^2-9}$

$\lim_{x\to 3} \dfrac{-1(\cancel{x-3})}{(\cancel{x-3})(x+3)} = \lim_{x\to 3} \dfrac{-1}{x+3} = \dfrac{-1}{3+3} = \boxed{-\dfrac{1}{6}}$

② $\lim_{x\to 0} \dfrac{\sqrt{x^2+4}-2}{x^2}$

$\lim_{x\to 0} \dfrac{\sqrt{x^2+4}-2}{x^2} \cdot \dfrac{\sqrt{x^2+4}+2}{\sqrt{x^2+4}+2} = \lim_{x\to 0} \dfrac{\cancel{x^2}+\cancel{4}-\cancel{4}}{\cancel{x^2}(\sqrt{x^2+4}+2)} = \lim_{x\to 0} \dfrac{1}{\sqrt{x^2+4}+2} = \dfrac{1}{\sqrt{0^2+4}+2} =$

③ $f(x) = \begin{cases} x+5, & x<2 \\ 3x+c, & x \geq 2 \end{cases}$ Value of c to make continuous

$x+5 = 3x+c$
$2+5 = 3(2)+c$ $c=1$
$7 = 6+c$
$-6 \quad -6$

④ $f(x) = \sqrt{x-5}$ What interval continuous?

$x-5 \geq 0$
$+5 \quad +5$ $\boxed{x \geq 5}$ or $\boxed{[5,\infty)}$

⑤ $f(x) = \dfrac{x-1}{x}$ $g(x) = x^2-9$ Where is $f(g(x))$ discontinuous?

$f(g(x)) = \dfrac{(x^2-9)-1}{(x^2-9)} = \dfrac{x^2-10}{(x-3)(x+3)}$ $x-3=0$ $x=3$ $x+3=0$ $x=-3$

⑥ $x^3 - xy = y^2$ Find $\dfrac{dy}{dx}$

$3x^2 - [1y + xy'] = 2yy'$
$3x^2 - y = 2yy' + xy'$

$\dfrac{3x^2-y}{2y+x} = \dfrac{y'(\cancel{2y+x})}{\cancel{2y+x}} \Rightarrow y' = \dfrac{3x^2-y}{2y+x}$