

$$1a) 4 - x > 0 \Leftrightarrow -x > -4 \Leftrightarrow x < 4$$

$$x - 1 > 0 \Leftrightarrow x > 1$$

$$D_f =]1, 4[$$

$$b) x^2 - 16 > 0 \Leftrightarrow x^2 > 16 \Leftrightarrow x > 4$$

$$D_g =]4, +\infty[$$

$$2a) \lim_{x \rightarrow 3} \frac{x^2 - 9}{x^2 - 5x + 6} \stackrel{0}{=} \lim_{x \rightarrow 3} \frac{\cancel{(x-3)}(x+3)}{(x-2)\cancel{(x-3)}} = \lim_{x \rightarrow 3} \frac{x+3}{x-2} = \frac{3+3}{3-2}$$

$$= \frac{6}{1} = 6$$

$$b) \lim_{x \rightarrow 0} \frac{\sin(5x)}{2x} = \lim_{x \rightarrow 0} \frac{\sin(5x)}{5x} \cdot \frac{5}{2} = \frac{\sin(5x)}{5x} \cdot 3 = 1 \cdot 3 = 3$$

$$| \frac{3 \sin(2x)}{2x} = 3 \cdot 1 = 3$$

$$c) \lim_{x \rightarrow 0} \frac{\sin(4x)}{\sin(2x)} = 2 \frac{\sin(2x)}{\sin(2x)} = 2 \times 1 = 2$$

3)

$$f(1) = \frac{x^2 - 1}{x - 1} = \frac{\cancel{(x-1)}(x+1)}{\cancel{x-1}} = x + 1 = 1 + 1 = 2$$

$$K = 2$$

$$4) f(0) = x^3 - 6x^2 + 9x - 1 = 0^3 - 6(0)^2 + 9(0) - 1 = -1$$

$$f(1) = x^3 - 6x^2 + 9x - 1 = 1^3 - 6(1)^2 + 9(1) - 1 = 1 - 6 + 9 - 1 = 3$$

$$f(0) = -1 < 0$$

$$f(1) = 3 > 0$$

$$5) \quad x+4 \neq 0 \Leftrightarrow x \neq -4$$

$$f(-4^+) = \frac{3x-2}{x+4} = \frac{3(-4^+)-2}{-4^++4} = \frac{-16}{0^+} = +\infty$$

$$\lim_{x \rightarrow +\infty} \frac{3x-2}{x+4} \underset{(1/x)}{=} \frac{3 - \frac{2}{x}}{1 + \frac{4}{x}} = \frac{3}{1} = 3$$

$$\Delta V = -4$$

$$\Delta H = 3$$

$$6) \quad a) \quad \frac{2x+3}{x^2+3x}$$

$$b) \quad \frac{6x^2}{\sqrt{2x^3-5}}$$

$$c) \quad e^{4x-x^2} \cdot (4-2x)$$

$$d) \quad \frac{3x^2(x+2) - 1(x^3-1)}{(x+2)^2} = \frac{3x^3 + 6x^2 - x^3 - 1}{(x+2)^2} = \frac{2x^3 + 6x^2 - 1}{(x+2)^2}$$

$$7) \quad f(2) = x^2 - 4x - 3 = 2^2 - 4(2) - 3 = 4 - 8 - 3 = -7$$

$$f'(2) = 2x - 4 \Leftrightarrow 2(2) - 4 = 4 - 4 = 0$$

$$y = 0 \quad x - (-7 - 0(2)) \leq -7$$

$$8a) \quad \int 6x^2 - 4x + 3 \, dx = \frac{6x^3}{3} - \frac{4x^2}{2} + 3x + C, \quad C \in \mathbb{R}$$

$$b) \quad \int \frac{3x^2+3}{x^3+3x} \, dx = \ln(x^3+3x) + C, \quad C \in \mathbb{R}$$

$$c) \int x^2 \cdot e^x dx = x^2 \cdot e^x - \int 2x \cdot e^x dx = x^2 \cdot e^x - \frac{2x^2}{2} \cdot e^x + C, C \in \mathbb{R}$$

$$d) \int x \cdot \ln(x) dx = x \cdot \frac{1}{x} - \int \ln(x) dx \Rightarrow x \cdot \frac{1}{x} - \frac{1}{x} + C, C \in \mathbb{R}$$

$$9) a) \int_1^3 2x-1 dx = \left[\frac{2x^2}{2} - x \right]_1^3 = \frac{2(3)^2}{2} - 3 - \frac{2(1)^2}{2} - 1 =$$

$$\frac{18}{2} - 3 - \frac{2}{2} - 1 = 9 - 3 - 1 - 1 = 5$$

$$b) \int_0^1 e^{2x} dx = \left[\frac{e^{2x}}{2} \right]_0^1 = \frac{e^{2(1)}}{2} - \frac{e^{2(0)}}{2} \approx 3$$

$$10) f(1) = \frac{4x^4}{4} + \frac{2x^2}{2} + C = 5 \Leftrightarrow \frac{4(1)^4}{4} + \frac{2(1)^2}{2} + C = 5$$

$$\Leftrightarrow \frac{4}{4} + \frac{2}{2} + C = 5 \Leftrightarrow 1 + 1 + C = 5 \Leftrightarrow 2 + C = 5$$

$$\Leftrightarrow C = 5 - 2$$

$$\Leftrightarrow C = 3$$

$$11) \int_0^2 2x - x^2 dx = \left[\frac{2x^2}{2} - \frac{x^3}{3} \right]_0^2 = \frac{2(2)^2}{2} - \frac{2^3}{3} - \frac{2(0)^2}{2} - \frac{0^3}{3}$$

$$= \frac{8}{2} - \frac{8}{3} - \frac{0}{2} - \frac{0}{3} = \frac{8}{2} - \frac{8}{3} = \frac{24}{6} - \frac{16}{6} = \frac{8}{6}$$

(x3) (x2)