1a) $\frac{4 \pm \sqrt{(-4)^2 - 4 \times 1 \times 3}}{2 \times 1} = \frac{4 \pm \sqrt{16 - 12}}{2} = \frac{4 \pm \sqrt{4}}{2}$

$\frac{4 + 2}{2} = \frac{6}{2} = 3$

$\frac{4 - 2}{2} = \frac{2}{2} = 1$

$D_f =]1, 3[$

b) $x^2 - 9 > 0 \Leftrightarrow x^2 > 9 \Leftrightarrow x > 3$

$D_g =]-\infty, -3[\cup]3, +\infty[$

c) $x - 1 \neq 0 \Leftrightarrow x \neq 1$

$x - 2 \geq 0 \Leftrightarrow x \geq 2$

$D_h = [-2, 1[\cup]1, +\infty[$

2)

a) $\lim\limits_{x \to 2} \frac{x^2 - 4}{x^2 - 5 + 6} = \frac{\cancel{(x-2)}(x+2)}{\cancel{(x-2)}(x-3)} = \frac{x+2}{x-3} = \frac{2+2}{2-3} =$

$\frac{4}{-1} = -4$

b) $\lim\limits_{x \to +\infty} \frac{4x^3 - 2x + 1}{2x^3 + x^2 - 3} = \frac{4 - \frac{2}{x^2} + \frac{1}{x^3}}{2 + \frac{1}{x} - \frac{3}{x^3}} = \frac{4}{2} = 2$

$(:x^3)$

c) $\frac{\sqrt{1 + 2x} - 1}{x} = \frac{\sqrt{1 + 2x} - 1}{x} \times \frac{\sqrt{1 - 2x} + 1}{\sqrt{1 + 2x} + 1} = \frac{(1 - 2x) + 1}{x(\sqrt{1 + 2x} + 1)}$

$\frac{2x}{}$

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

$K=2$

4) $g(0)=x^3-3x+1 = (0)^3-3(0)+1 = 1$

$g(1) = x^3-3x+1 = 1^3-3(1)+1 = -1$

$g(0) = 1 > 0$

$g(1) = -1 < 0$

5) $f(-2^+) = \dfrac{3x-1}{x+2} = \dfrac{3(-2)-1}{-2+2} = \dfrac{-7}{0^+} = +\infty$

$\lim\limits_{x\to+\infty} \dfrac{3x-1}{x+2}_{(/x)} = \dfrac{3-\frac{1}{x}}{1+\frac{2}{x}} = 3$

$AV = -2$
$AH = 3$

6)
a) $5x^4-12x^2+2$

b) $4(3x^2+1)^3 \cdot 6x$

c)

d) $(e^{2x}\cdot 2)\cdot \dfrac{1}{x}$

7) $f(1) = x^3-2x = 1^3-2(1) = -1$

$f'(1) = 3x^2-2 = 3(1)^2-2 = 1$

Ponto $=(1,-1)$
$RT = -1$

8)

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

b) $\int \frac{4x}{x^2+3}\, dx = \ln(x^2+3) + c, c \in \mathbb{R}$

c) $\int x \cdot \cos(x)\, dx = x \cdot sen(x) - \int sen(x) \cdot 1 = x \cdot sen(x) - \cos(x) + c, c \in \mathbb{R}$

d) $\int x^2 \cdot e^x\, dx = x^2 \cdot e^x - \int 2x \cdot e^x\, dx = x^2 \cdot e^x - 2x \cdot e^x - \int 2e^x\, dx =$

$x^2 \cdot e^x - 2x \cdot e^x - 2e^x - \int e^x\, dx =$

$x^2 \cdot e^x - 2x \cdot e^x - 2e^x - e^x + c, c \in \mathbb{R}$

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

$\left(\frac{2(3)^3}{3} - \frac{3^3}{2} + 3\right) - \left(\frac{2(1)^3}{3} - \frac{1^2}{2} + 1\right) = \left(\frac{54}{3} - \frac{27}{2} + 3\right) - \left(\underset{(\times 6)}{\frac{2}{3}} - \underset{(\times 3)}{\frac{1}{2}} + 1\right) =$

$= (18 - 9 - 3) - \left(\frac{12}{6} - \frac{3}{6} - 1\right) = 6 - \left(\underset{(/3)}{\frac{9}{6}} - 1\right) = 6 - \left(\frac{3}{2} - \underset{(\times 2)}{\frac{1}{1}}\right) = 6 - \frac{3}{2} - \frac{2}{2} =$

$= \underset{(\times 2)}{\frac{6}{1}} - \frac{1}{2} = \frac{12}{2} - \frac{1}{2} = \frac{11}{2}$

10) $F(1) = 2\ln(x) + 2x^2 + c = 3, c = 1$

11)

$6 - x^2 = 6 - 4 = -2$

$\int_{-2}^{2} 2 - 6 - x^2\, dx = \left[2x - 6x - \frac{x^3}{3}\right]_{-2}^{2} = \left(2(2) - 6(2) - \frac{2^3}{3}\right) - \left(2(-2) - 6(-2) - \frac{(-2)^3}{3}\right)$

$= \left(4 - 12 - \frac{8}{3}\right) + \left(4 + 12 - \frac{-8}{3}\right) = \left(\underset{(\times 3)}{\frac{-8}{1}} - \frac{8}{3}\right) + \left(\underset{(\times 3)}{\frac{16}{1}} - \frac{-8}{3}\right) =$

$= \left(\frac{-24}{3} + \frac{8}{3}\right) + \left(\frac{48}{3} - \frac{-8}{3}\right) = \frac{-16}{3} + \frac{56}{3} = \frac{40}{3}$