Exercice 1

1) $f(-12) = 12$ $f'(-12) = -\frac{3}{2}$ $f(-8) = -2$ $f'(-8) = \frac{5}{2}$

$f(2) = -4$ $f'(2) = 0$

2) Equation de la tangente en E

$f(8) = 4$ $f'(8) = 3$

$$y = 3(x-8) + 4$$

T_E : $y = 3x - 20$

3) Equation tangente en F

$f(16) = -2$ $f'(16) = -\frac{1}{2}$

$$y = -\frac{1}{2}(x-16) + -2$$

T_F : $y = -\frac{1}{2}x + 6$

Exercice 2

1) $$\frac{f(2+h) - f(2)}{h} = \frac{\frac{1}{(2+h+3)} - \frac{1}{5}}{h} = \frac{\frac{5-(5+h)}{5(5+h)}}{h}$$

$$= \frac{-h}{5h(5+h)} = -\frac{1}{5(5+h)}$$

2) $$\lim_{h \to 0} \frac{f(2+h) - f(2)}{h} = \lim_{h \to 0} -\frac{1}{5(5+h)} = -\frac{1}{25}$$

f est dérivable en 2 et on a : $f'(2) = -\frac{1}{25}$

Exercice 3

1) $f'(x) = 12x^3 - 6x^2 + 3$ $D_{f'} = \mathbb{R}$

2) $g'(x) = \frac{-3}{2\sqrt{5-3x}}$ $D_{g'} =]-\infty ; \frac{5}{3}[$

3) $h'(x) = -\frac{3}{(4+x)^2}$ $D_{h'} = \mathbb{R} \setminus \{-4\}$

4) $k(x) = 2x^{-2} + 3x^{-3}$

$k'(x) = -4x^{-3} - 9x^{-4} = -\frac{4}{x^3} - \frac{9}{x^4}$ $D_{k'} = \mathbb{R}^*$

Exercice 4

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

2) $\Delta = 4 - 4(-1)(3) = 16 = (4)^2$

$x_1 = \dfrac{2-4}{-2} = +1 \qquad x_2 = \dfrac{2+4}{-2} = -3$

$f'(x) = -(x-1)(x+3)$ 1

négatif sauf entre les racines

x	$-\infty$		-3		1		$+\infty$
$f'(x)$		$-$	0	$+$	0	$-$	
f		$\searrow$	-8	$\nearrow$	$\frac{8}{3}$	$\searrow$	

1

Exercice 5

1) $D_f = \mathbb{R} \setminus \{1\} =]-\infty ; 1[\cup]1 ; +\infty[$ 0,5

2) f est du type $\dfrac{u}{v}$ $\qquad u(x) = x^2 + 3 \qquad v(x) = x - 1$

$\qquad u'(x) = 2x \qquad v'(x) = 1$

$$f'(x) = \frac{2x(x-1) - (x^2+3)}{(x-1)^2}$$

$$f'(x) = \frac{x^2 - 2x - 3}{(x-1)^2}$$ 1,5

3) $\forall x \in D_f \quad (x-1)^2 > 0$ le signe de $f'(x)$ est le signe de $x^2 - 2x - 3$

$x^2 - 2x - 3 = (x+1)(x-3)$ 0,5

4) Tableau de variations

positif sauf entre les racines

x	-8		-1		1		3		8
$f'(x)$		$+$	0	$-$	‖	$-$	0	$+$	
f	$-\frac{67}{9}$	$\nearrow$	-2	$\searrow$	‖	$\searrow$	6	$\nearrow$	$\frac{67}{7}$

1,5