MEMO   Calulus Graphs Point Sketching

QUESTION/*VRAAG* 10

10.1		
	✓ $x = -1$ and $x = 2$ ✓ TP at $x = -1$ ✓ TP at $x = 1$ ✓ shape	(4)

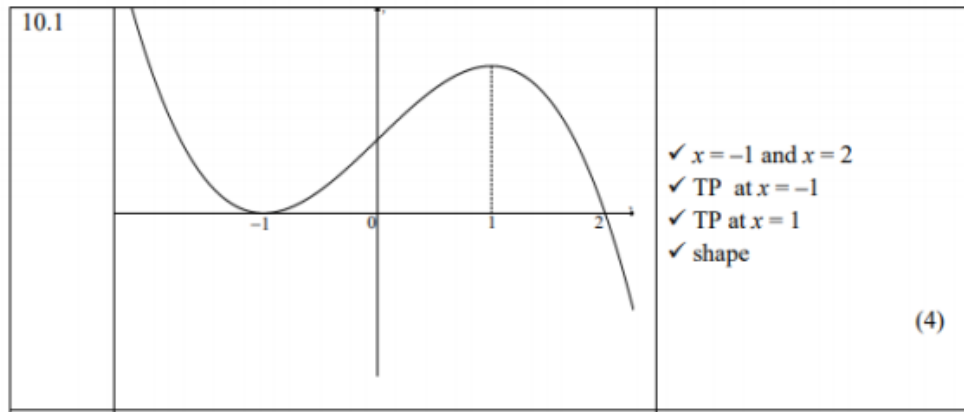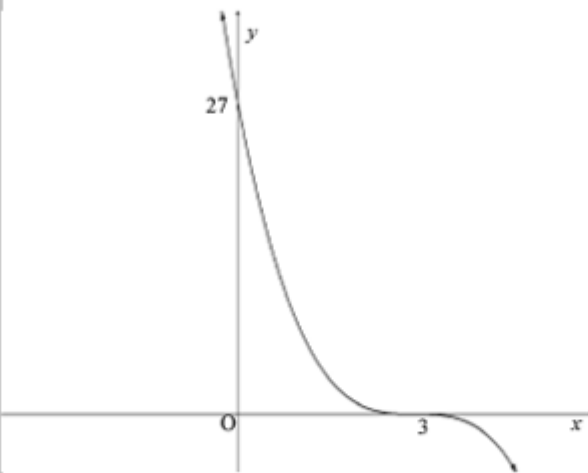**QUESTION/*VRAAG* 9**

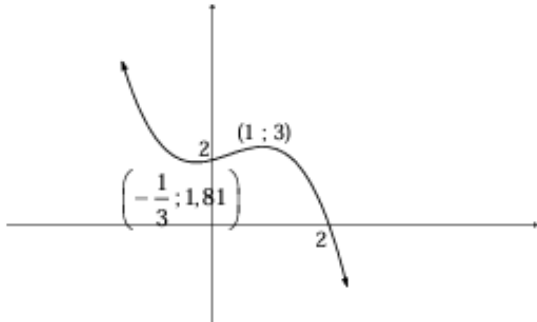| 9.1	$f'(x) = 9x^2$ $3x^3 = 9x^2$ $3x^3 - 9x^2 = 0$ $3x^2(x-3) = 0$ $x = 0$ or $x = 3$	✓ $f'(x) = 9x^2$ ✓ $x = 0$ ✓ $x = 3$ (3)
9.2.1	For f and f'	✓ answer (1)
9.2.2	The point $(0 ; 0)$ is : A point of inflection of f A turning point of f'	✓ f : inflection point ✓ f' : turning point (2)
9.3	$f''(x) = 18x$ Distance $= f''(1) - f'(1)$ $\qquad = 18(1) - 9(1)^2$ $\qquad = 9$	✓ $f''(x) = 18x$ ✓ substitution ✓ answer (3)
9.4	$3x^3 - 9x^2 < 0$ $3x^2(x-3) < 0$ but $3x^2 > 0$ $\therefore x - 3 < 0$ $\therefore x < 3 , x \neq 0$	✓ $3x^3 - 9x^2 < 0$ ✓ factors ✓ $x < 3$ ✓ $x \neq 0$ (4)
		[13]

9.2		✓ y – intercept of a cubic graph ✓ point of inflection and stationary point, $x = 3$ ✓ concave up for $x < 3$ and concave down for $x > 3$
		(3)

QUESTION 8/ VRAAG 8

8.1	$f'(x) = mx^2 + nx + k$	
	$f'(x) = m\left(x + \dfrac{1}{3}\right)(x-1)$	✓ substitution of $\left(-\dfrac{1}{3}; 0\right)$ and $(1 ; 0)$
	$1 = m\left(0 + \dfrac{1}{3}\right)(0-1)$	✓ substitution of $(0 ; 1)$
	$1 = -\dfrac{1}{3}m$	
	$\therefore m = -3$	✓ $m = -3$
	$f'(x) = -3\left(x + \dfrac{1}{3}\right)(x-1)$	
	$f'(x) = -3\left(x^2 - \dfrac{2}{3}x - \dfrac{1}{3}\right)$	✓ $f'(x) = -3\left(x^2 - \dfrac{2}{3}x - \dfrac{1}{3}\right)$
	$f'(x) = -3x^2 + 2x + 1$	
	$\therefore n = 2$	✓ $n = 2$
	$\therefore k = 1$	✓ $k = 1$ (6)
	OR/OF	**OR/OF**
	$k = 1$	✓ $k = 1$
	$0 = m + n + 1$ and $\dfrac{1}{9}m - \dfrac{1}{3}n + 1 = 0$	
	$m + n = -1$ (1)	
	$m - 3n = -9$ (2)	✓ $m + n = -1$ ✓ $m - 3n = -9$
	(1) – (2)	
	$4n = 8$	✓ $4n = 8$
	$\therefore n = 2$	✓ $n = 2$
	$m + 2 = -1$	
	$\therefore m = -3$	✓ $m = -3$ (6)

8.2.1	$f(x) = -x^3 + x^2 + x + 2$ $f\left(-\dfrac{1}{3}\right) = \dfrac{49}{27} = 1{,}81$ $T.P\left(-\dfrac{1}{3}\,;\,\dfrac{49}{27}\right)$ $f(1) = 3$ $T.P(1\,;\,3)$	✓ x-coordinates of the TP ✓ $T.P\left(-\dfrac{1}{3}\,;\,\dfrac{49}{27}\right)$ ✓ $T.P(1\,;\,3)$ (3)

8.2.2	$f(x) = -x^3 + x^2 + x + 2$ $-x^3 + x^2 + x + 2 = 0$ $(x-2)(-x^2 - x - 1) = 0$ $x = 2$ or no solution 	✓ $x = 2$ ✓ one x-intercept ✓ two turning points ✓ y-intercept ✓ shape: neg cubic (5)

8.3.1	$a = \dfrac{-\dfrac{1}{3} + 1}{2}$
	
	 $= \dfrac{1}{3}$
	
	 OR/OF
	 $f'(x) = -3x^2 + 2x + 1$
	 $f''(x) = -6x + 2$
	 $f''(a) = -6a + 2 = 0$
	        $-6a = -2$
	             $a = \dfrac{1}{3}$
		✓ answer (1)
		
		 OR/OF
		
		 ✓ answer (1)

8.3.2	$b < \dfrac{4}{3}$ units	✓ $\dfrac{4}{3}$ ✓ $b < \dfrac{4}{3}$ (2)
		[17]

Question 9.3

9.3.1 $x = 1$ and $x = 5$

9.3.2 $x < 1$ or $x > 5$