1. Determine each of the following derivatives. You do not need to simplify. You can leave your answer the way

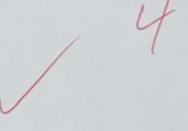
it appears after your first line.  
a. 
$$f(x) = 3(2x^3 - 19x^2 + 1)^6(5x - 4)^8$$
  

$$f'(x) = (18)(2x^3 - 19x^2 + 1)^5(6x^2 - 38x)(5x^{-1})^8 + (3)(2x^3 - 19x^2 + 1)^6(8)(5x^{-1})^7(5)$$

b. 
$$g(x) = \frac{3x+4}{(8x^2-7x+2)^5}$$
  
 $g'(x) = \frac{(9x^2-7x+2)^5(3) - (3x+4)(5)(9x^2-7x+2)^4(16x-7)}{(9x^2-7x+2)^4(16x-7)^4$ 



2. The curve  $y = x^3 + ax^2 + bx + 14$  has a horizontal tangent at (4, 30). Solve for a and b. /4 marks



$$a = -9$$
  $b = 24$ 

3. The position from its starting point, s, of an object at t seconds is given by  $s(t) = \frac{8t}{2t^2 + 18}$ ,  $t \ge 0$ . When does the object change direction?

change in direction means 
$$s'(t)=0$$
  
 $s'(t)=\frac{8t}{2t^2+18}$   
 $s'(t)=\frac{(2t^2+18)(8)-(8t)(4t)}{(2t^2+18)^2}$   
 $0:16t^2+144-32t^2$ 

0 = 161° + 144 - 321° 0 = -161° + 144 161° = 144 161° = 144

6=3 seconds

1

The object changes direction at a time of \_\_\_\_\_\_ seconds.

4. We are given the following table, and we know that h(x) = f(g(x)). Evaluate h'(3). /3 marks

X	f(x)	g(x)	f'(x)	g'(x)
-1	2	12	0	6
1	3	5 /	-1	-6
3	-4	8	-2	-8
3	9	-8	-4	11
5	-6	1	-7	13