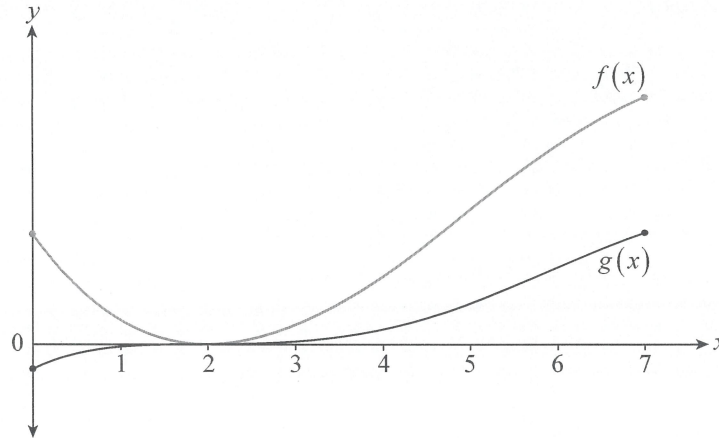


**Question 7** (9 marks)

Figure 6 shows the graphs of  $y = f(x)$  and  $y = g(x)$  for  $0 \leq x \leq 7$ .



**Figure 6**

The graph of each function has exactly one stationary point; it is located at  $x = 2$ .

- (a) State the nature of the stationary point for the graph of  $y = f(x)$  at  $x = 2$ .

It's a local minimum
----------------------

(1 mark)

- (b) Figure 7 shows the sign diagram for the second derivative of the function  $g(x)$ .



**Figure 7**

State the nature of the point that is located at  $x = 2$  on the graph of  $y = g(x)$ .

It's a stationary (horizontal) inflection point
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(1 mark)

- (c) The graph of  $y = f(x)$  in Figure 6 has one point of inflection at  $x = 5$ .  
Determine the interval(s) for which  $f'(x)$  is increasing.

$0 \leq x \leq 5$
-------------------

(1 mark)

(d) (i) For  $0 < x < 2$ , which *one* statement is true? Tick the appropriate box.

$f'(x) < g'(x)$       
  $f'(x) = g'(x)$       
  $f'(x) > g'(x)$       
 (1 mark)

(ii) For  $0 < x < 2$ , which *one* statement is true? Tick the appropriate box.

$f''(x) < g''(x)$       
  $f''(x) = g''(x)$       
  $f''(x) > g''(x)$       
 (1 mark)

(iii) For  $2 < x < 7$ , given that the value of  $f(x) - g(x)$  is increasing, which *one* statement is true? Tick the appropriate box.

$f'(x) < g'(x)$       
  $f'(x) = g'(x)$       
  $f'(x) > g'(x)$       
 (1 mark)

(e) Figure 8 shows the graph of  $y = f'(x)$  for  $0 \leq x \leq 7$ .

On the axes in Figure 8, sketch a graph of  $y = g'(x)$  for  $0 \leq x \leq 7$ .

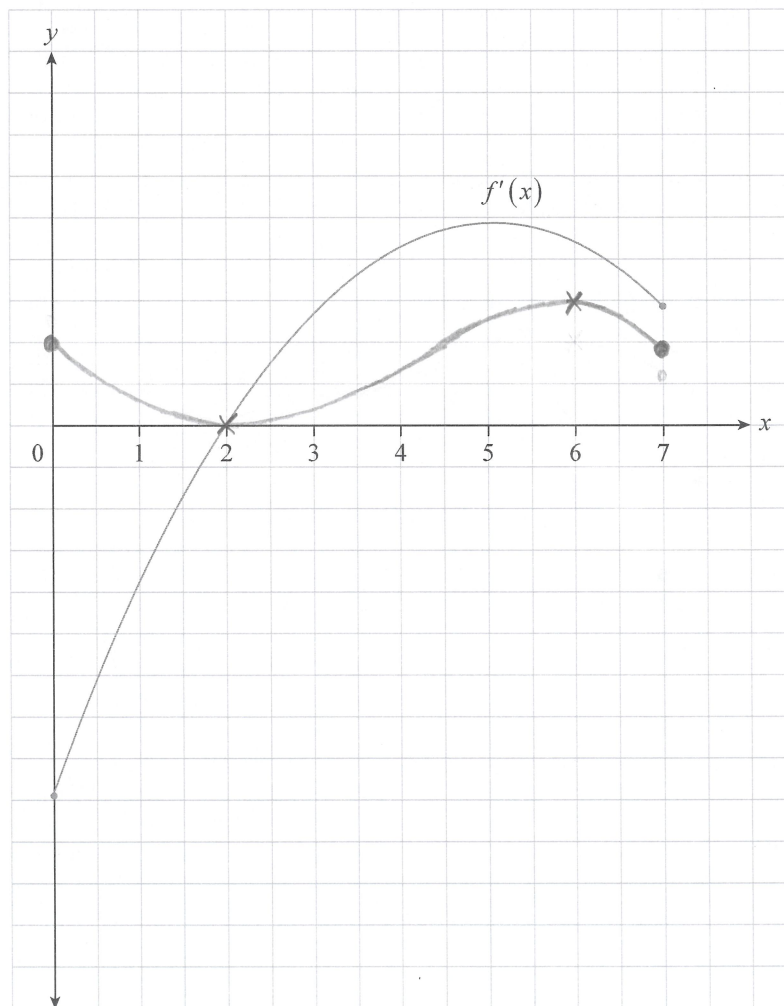


Figure 8

(3 marks)