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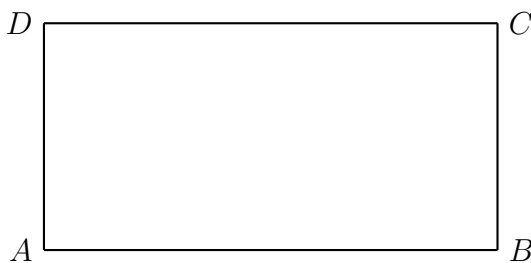
Homework: IB Differential calculus exam problems

1. Let $f(x) = \cos 2x$ and $g(x) = \ln(3x - 5)$.
 - (a) Find $f'(x)$.
 - (b) Find $g'(x)$.
 - (c) Let $h(x) = f(x) \times g(x)$. Find $h'(x)$.
2. Consider the curve with equation $f(x) = px^2 + qx$, where p and q are constants. The point A(1, 3) lies on the curve. The tangent to the curve at A has gradient 8. Find the value of p and of q .
3. The values for $f(x)$, $g(x)$, and their derivatives when $x = 2$ and $x = 5$ are given in the table.

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
2	3	2	5	-2
5	-1	4	2	3

Let $h(x) = f(x)g(x)$

- (a) Find $h(2)$.
 - (b) Find $h'(5)$.
4. A farmer wishes to create a rectangular enclosure, ABCD, of area 525 m^2 , as shown below. The fencing used for side AB costs \$11 per metre. The fencing for the other



three sides costs \$3 per metre. The farmer creates an enclosure so that the cost is a minimum. Find this minimum cost.

5. In an arithmetic sequence, $S_{40} = 1900$ and $u_{40} = 106$. Find the value of u_1 and of d .

6. Let $f(x) = 5 \cos \frac{\pi}{4}x$ and $g(x) = -0.5x^2 + 5x - 8$, for $0 \leq x \leq 9$.

(a) On the same diagram, sketch the graphs of f and g .

(b) Consider the graph of f . Write down

- i. the x-intercept that lies between $x = 0$ and $x = 3$;
- ii. the period;
- iii. the amplitude.

(c) Consider the graph of g . Write down

- i. the two x -intercepts;
- ii. the equation of the axis of symmetry.