

Revision for Tracking Test 2

1. a) Express $f(x) = \frac{2x^2 + 3x}{(2x+3)(x-2)} - \frac{6}{x^2 - x - 2}$ as a single fraction in its simplest form.

b) Hence solve the equation $f'(x) = -4$

2. When a tree of a certain species was planted it was 2 metres in height and after 2 years its height was measured as 3.81 metres. The height, h metres, of this tree is modelled by the equation $h = A - Be^{-kt}$, where A , B and k are positive constants. Given that this species of tree will reach in its lifetime a height of 12 metres, find the value of t when $h = 10$.

3. The diagram shows the graph of $y = f(x)$, $-5 \leq x \leq 5$. The point $M(2, 4)$ is the maximum turning point of the graph.

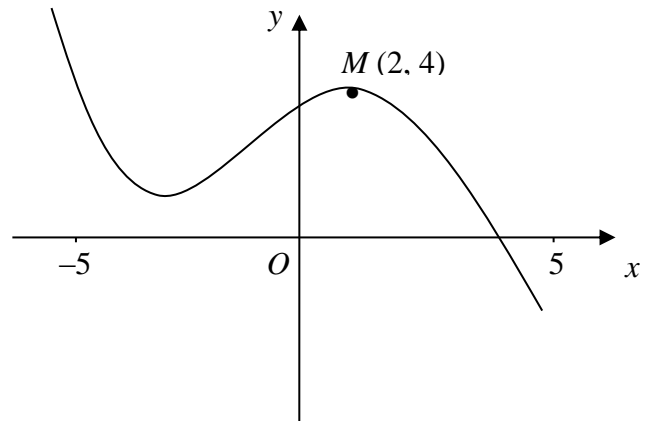
Sketch, on separate diagrams, the graphs of

(a) $y = f(x) + 3$,

(b) $y = |f(x)|$,

(c) $y = f(|x|)$.

Show on each graph the coordinates of any maximum turning points.



4. Carry out the following integrations

a) $\int \frac{x^5}{7x^6+3} dx$

b) $\int \cos x \sin^6 x dx$

c) $\int \frac{2}{\sqrt{x+4}} dx$

5. The functions f and g are defined by $f(x) = 2x + \ln 2$, $x \in \mathbb{R}$,
 $g(x) = x e^{2x}$, $x \in \mathbb{R}$.

(a) Prove that the composite function gf is

$$gf(x) = x 4e^{4x}, \quad x \in \mathbb{R}.$$

(b) Sketch the curve with equation $y = gf(x)$, and show the coordinates of the point where the curve cuts the y -axis.

(c) Write down the range of gf .

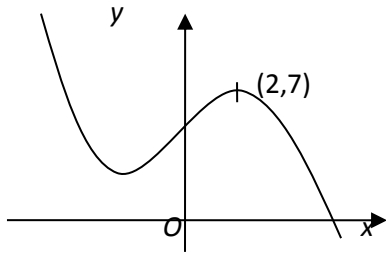
(d) Find the value of x for which $\frac{d}{dx} [gf(x)] = 3$, giving your answer to 3 significant figures.

Answers

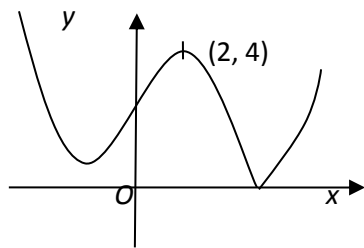
1. a) $\frac{x+3}{x+1}$ b) $-1 \pm \frac{1}{2}\sqrt{2}$

2. $t=16$

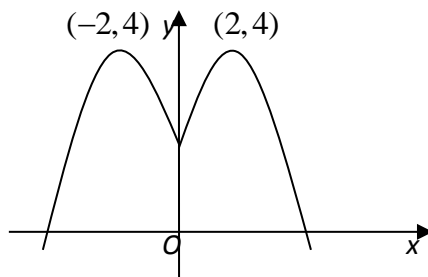
3. (a)



(b)



(c)



4. a) $\frac{1}{42} \ln|7x^6 + 3| + c$

b) $\frac{1}{7} \sin^7 x + c$

c) $4(x+4)^{\frac{1}{2}} + c$

5 b) see diagram

c) $gf(x) > 0$

d) $x = -0.418$

