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VCE Mathematical Methods ¾

Integration I [4.2]

Test

24 Marks. 1 Minute Reading. 19 Minutes Writing.

Results:

Test Questions	_____ / 18
Extension Test Questions	_____ / 6

Section A: Test Questions (18 Marks)

Question 1 (3 marks)

Tick whether the following statements are **true** or **false**.

Statement	True	False
a. When the function is increasing, the right-endpoint approximation will always be an underestimation.		
b. Trapezoidal approximation is always the average of left and right-endpoint approximation.		
c. When the question says "find the area", it can be signed or total area.		
d. Signed area is always positive and represents the change of the antidiff. function.		
e. When finding the total area (without using modulus), we solve for areas above and below the x-axis separately.		
f. If the two functions are both below the x-axis, we do **Bottom–Top** to find the area between them.		

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Question 2 (6 marks)

a. Approximate the area under $y = x^3$ between $x = 1$ to $x = 5$ using the right-endpoint method.

Use step size of 2. (2 marks)

b. Approximate the area under $y = x^3$ between $x = 1$ to $x = 5$ using the trapezoidal method.

Use a step size of 2. (2 marks)

c. Determine which answers out of **part a.** and **b.** were more accurate overall.

State whether the approximation was underestimation or overestimation. (2 marks)

Question 3 (2 marks)

Let $f(x) = (2x - 1)^3$. Find the signed area under the function $f(x)$ from $x = 0$ to $x = 2$.

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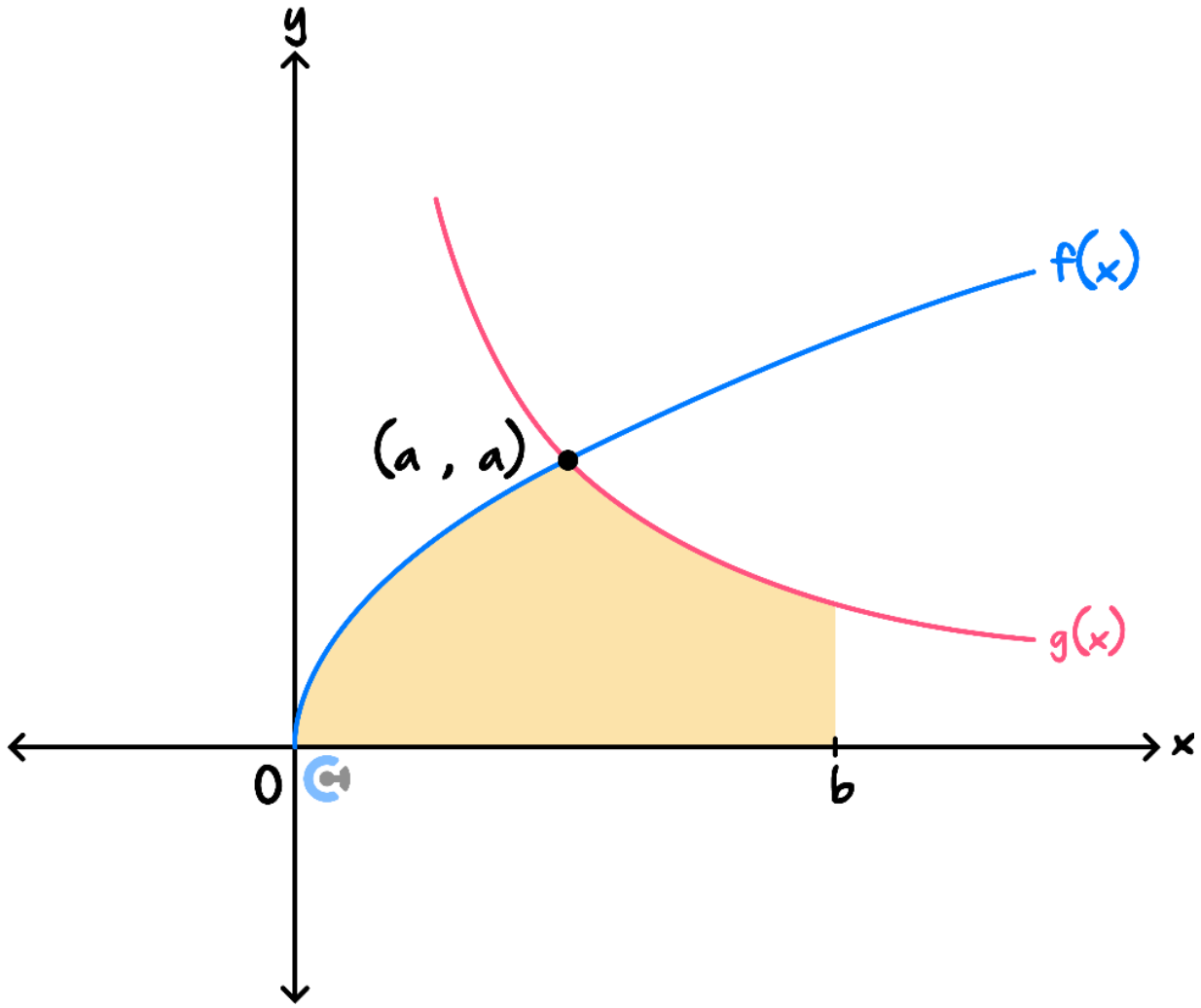
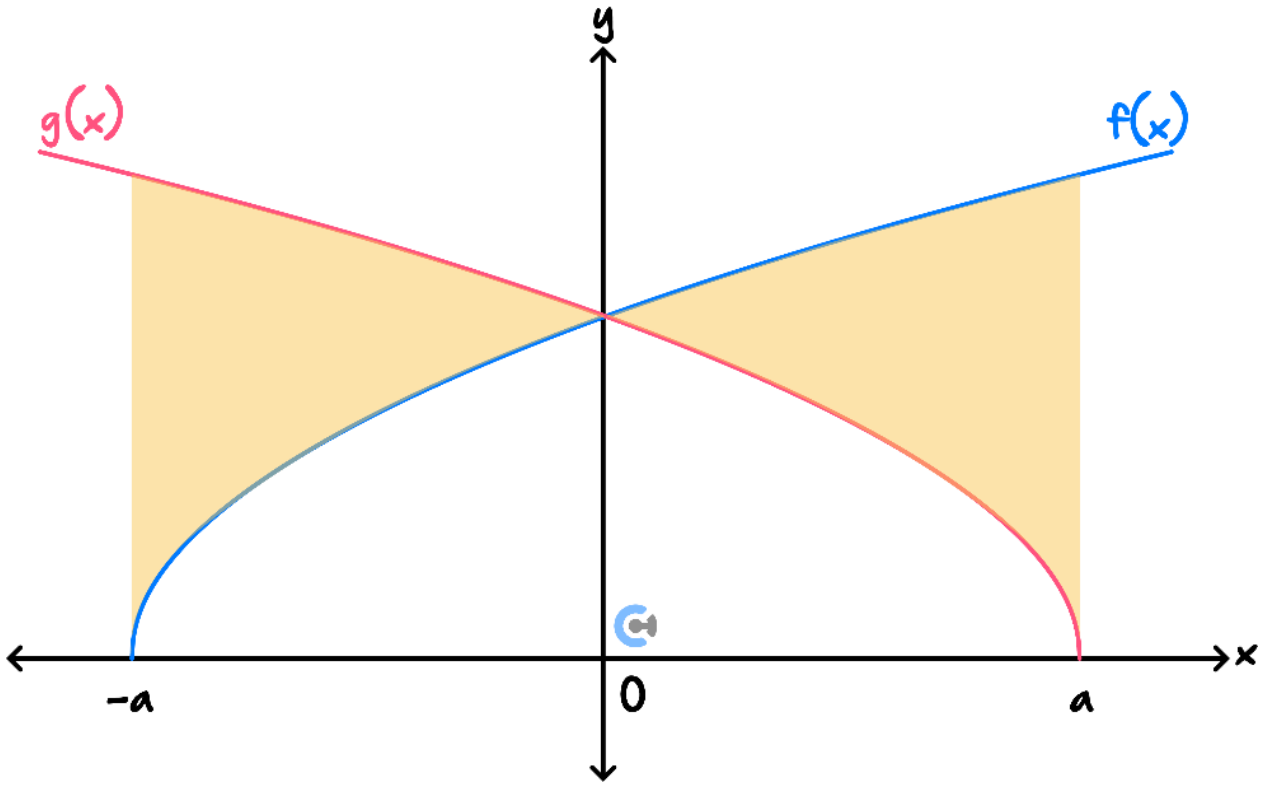
Question 4

Construct the integral for the shaded region given in the diagram.



Question 5

Construct the integral for the shaded region given in the diagram.



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Question 6 (4 marks)

Let $f(x) = 2\cos(2x) - 1$. Find the area bounded by the graph of $y = f(x)$, the x-axis, the lines $x = 0$ and $x = \frac{\pi}{4}$.

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Question 7 (3 marks)

Find the area enclosed by the following two curves $-x^2 + 4$ and $-3x$.

4^3

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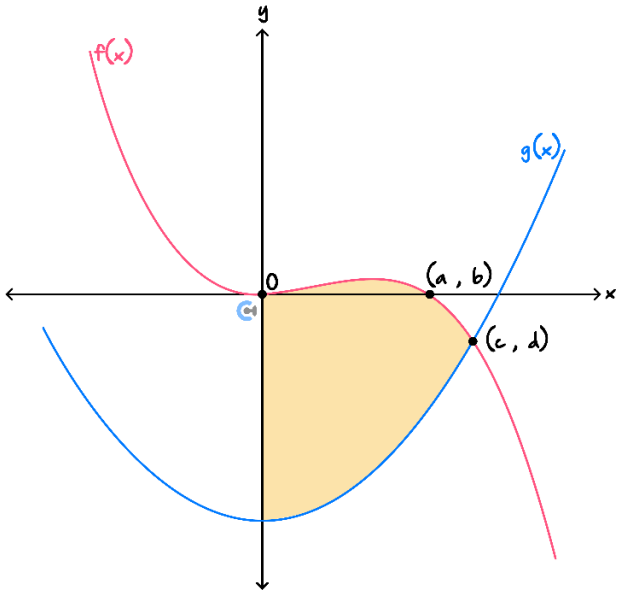
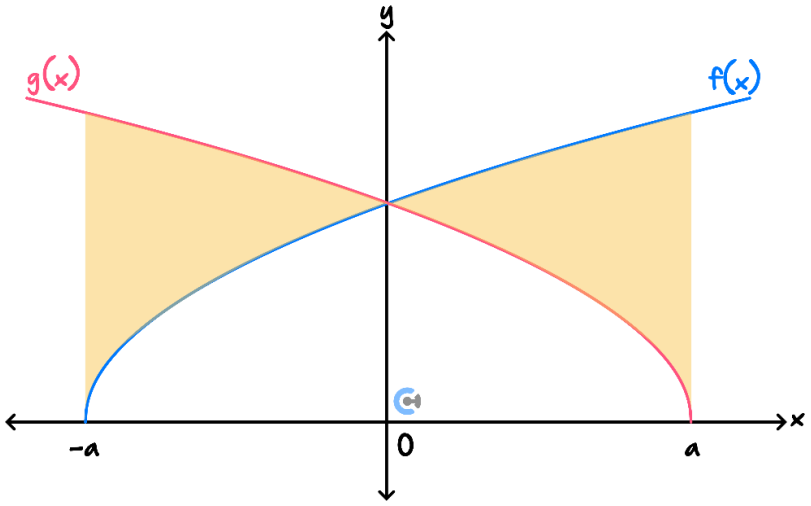
Question 8

Construct the integral in the most simplified way possible for the shaded region given in the diagram.

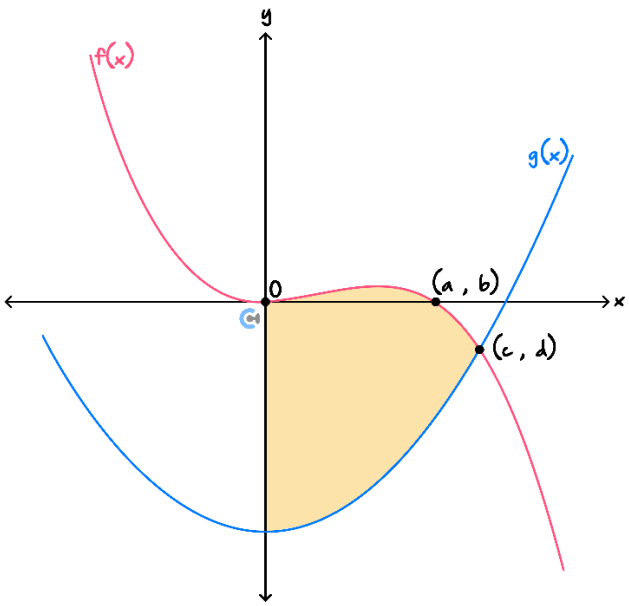
a.



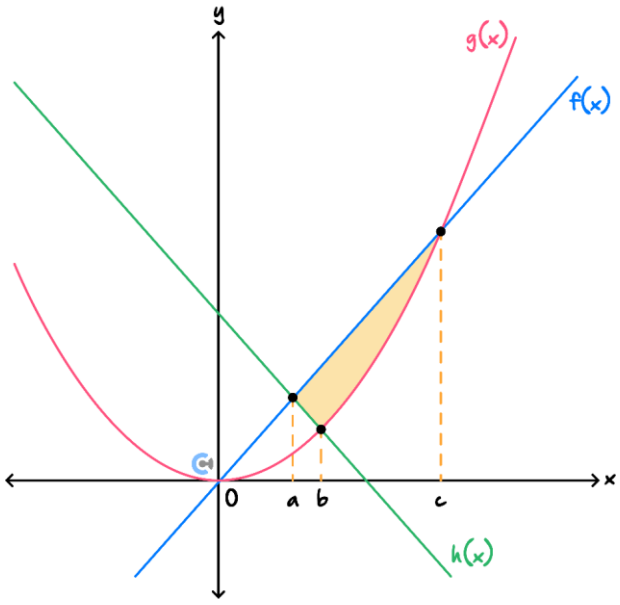
b.



c.



d.



Section B: Extension Test Questions (6 Marks)

Question 9 (3 marks)

Let $f: [3, \infty) \rightarrow f(x) = x^3 - 3x^2 - 9x + 5$.

Find the area bounded by $y = f^{-1}(x), y = 6, y = 8$ and the y-axis.

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Question 10 (3 marks) **Tech-Active.**

Let $f(x) = e^x - 2$.

Find the area bounded by $y = f(x)$ and $y = f^{-1}(x)$.

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