Task 1: Give it a goes

SIT190 - week 10 -quiz -short

Click on a question number to see how your answers were marked and, where available, full solutions.

Question Number	Score	
Question 1	4 / 4	Review
Question 2	0 / 4	Review
Question 3	6 / 6	Review
Total	**10 / 14 (71%)**	

Performance Summary

Exam Name:	SIT190 - week 10 -quiz -short
Session ID:	15665874293
Student's Name:	COWLISHAW, Ethan Del (edcowlishaw)
Exam Start:	Tue May 14 2024 20:59:30
Exam Stop:	Tue May 14 2024 21:45:20
Time Spent:	0:45:49

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SIT190 - week 10 -quiz -short

Click on a question number to see how your answers were marked and, where available, full solutions.

Question Number	Score	
Question 1	4 / 4	Review
Question 2	4 / 4	Review
Question 3	6 / 6	Review
Total	**14 / 14 (100%)**	

Performance Summary

Exam Name:	SIT190 - week 10 -quiz -short
Session ID:	13097054832
Student's Name:	COWLISHAW, Ethan Del (edcowlishaw)
Exam Start:	Sat May 18 2024 09:41:06
Exam Stop:	Sat May 18 2024 10:30:32
Time Spent:	0:49:25

In the first give it a go, I was completely stumped on how to approach the $\sqrt{\frac{1}{z}}$ and the $\frac{x^5x^4}{x^2}$ problem while the rest I could do given enough time. As a learning measure, I studied up on how to do both using online resources and the teacher. The second go around, I could easily solve the second problem but not the first still. Mid-way through the quiz, I studied on how to solve the square root and I managed, through a lot of effort, to understand how to do the problem.

Both attempts and still now, I struggle to understand when to enact $b - a$ as it seems to give me the correct answer only about 50% of the time. I need to ask for help with this as I have not found a resource that I can understand.

I strongly understand how to calculate the areas intuitively now as I took notes and draw up diagrams to understand what is actually happening.

You may notice I took *longer* on the second attempt than on the first attempt but I did achieve a greater accuracy, so I consider that progress.

Task 2: Integrals

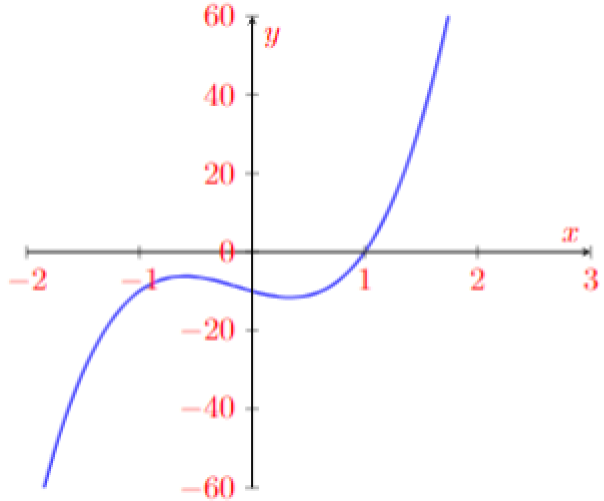

FIGURE 1. Graph $y = 13x^3 + 5x^2 - 8x - 10$

$y = 13x^3 + 5x^2 - 8x - 10$
$\int(13x^3 + 5x^2 - 8x - 10)$
-> $\frac{13}{4}x^{3+1} + \frac{5}{3}x^{2+1} - \frac{8}{2}x^{1+1} - \frac{10}{1}x^{0+1} + C$
$y = \frac{13}{4}x^4 + \frac{5}{3}x^3 - 4x^2 - 10x + C$

1) Find $\int_0^1 (13x^3 + 5x^2 - 8x - 10)dx$

$y = \frac{13}{4}x^4 + \frac{5}{3}x^3 - 4x^2 - 10x$
-> $[\frac{13}{4}x^4 + \frac{5}{3}x^3 - 4x^2 - 10x]_0^1$

Upper bound (b)

$x = 1$
-> $\frac{13}{4}(1)^4 + \frac{5}{3}(1)^3 - 4(1)^2 - 10(1)$
-> $\frac{13}{4} \times 1 + \frac{5}{3} \times 1 - 4 \times 1 - 10 \times 1$
-> $\frac{13}{4} + \frac{5}{3} - 4 - 10$
-> $\frac{39}{12} + \frac{20}{12} - \frac{48}{12} - \frac{120}{12}$
$= -\frac{109}{12}$

Lower bound (a)

$x = 0$
-> $\frac{13}{4}(0)^4 + \frac{5}{3}(0)^3 - 4(0)^2 - 10(0)$
-> $0 + 0 - 0 - 0$
$= 0$

Finding the integral of $[f(x)]_0^1$

$(-\frac{109}{12}) - (0)$
$\text{integral} = -\frac{109}{12}$

Since areas can't be negative in a real sense,
$\text{area} = \frac{109}{12}$ units^2

2) Find $\int_1^2 (13x^3 + 5x^2 - 8x - 10)dx$

$y = \frac{13}{4}x^4 + \frac{5}{3}x^3 - 4x^2 - 10x$
-> $[\frac{13}{4}x^4 + \frac{5}{3}x^3 - 4x^2 - 10x]_1^2$

Upper bound (b)
$x = 2$
-> $\frac{13}{4}(2)^4 + \frac{5}{3}(2)^3 - 4(2)^2 - 10(2)$
-> $\frac{13}{4}(16) + \frac{5}{3}(8) - 4(4) - 20$
-> $\frac{208}{4} + \frac{40}{3} - 16 - 20$
-> $52 + \frac{40}{3} - 16 - 20$
-> $\frac{156}{3} + \frac{40}{3} - \frac{48}{3} - \frac{60}{3}$
$= \frac{88}{3}$

Lower bound (a)
$x = 1$
We can reuse our answer from **(1)**
$= -\frac{109}{12}$

Finding the integral of $[f(x)]_0^1$
$\frac{88}{3} - -\frac{109}{12}$
$= \frac{352}{12} + \frac{109}{12}$
$= \frac{461}{12}$
$= \frac{461}{12}$ units^2

3) Using (1) and (2)'s solutions, find the area bounded by the function and the x-axis between $x = 0$ and $x = 2$

$\frac{461}{12} + \frac{109}{12} = \frac{570}{12} = \frac{95}{2}$ units^2

4) Find $\int_0^2 (13x^3 + 5x^2 - 8x - 10)dx$. Explain why this isn't the same area as (3)

At $x = 0$, $\int(f(x)) = 0$
At $x = 2$, $\int(f(x)) = \frac{88}{3}$

$\frac{88}{3} - 0 = \frac{88}{3}$.
By definition, a definite integral **sums** up the areas between the x-axis and a given curve. As the areas below the x-axis can be negative, this may skew the total area, which in this case it does. In other words, it does not discriminate between negative or positive areas whereas taking appropriate intervals does.

On crossing the x-axis, for a good reading of area, it is recommended to take the integral at that point and then another integral at a next point like we did for question **(1)** and **(2)**, calculating the absolute value of them, then adding them together. I perform the last two steps instead of 'simply' subtracting positive from negatives to purposefully avoid the subtractions and additions that I find confusing and prone-to-error. I do keep in mind that I may have to find the difference rather than the sum.