

The solutions for this quiz **MUST** be submitted in gradescope by **11:55pm on Thursday, April 13, 2023**.

You will be graded on both the correct answer and the correctness of the work that you provide to justify that answer. I expect to see all of your work in a neat and orderly manner.

You are allowed to use your class notes and a calculator when working the quiz. However, I would suggest trying to do quiz without using any other resources to see if you actually know the material. You are not allowed to ask other people for help with the questions. If you need clarification on a question, send me an e-mail or ask during office hours.

You do not need to turn in this cover sheet when you submit your work. You are expected to tell webassign where on what pages your questions are located.

I would suggest setting an alarm on your phone so that you do not forget to submit the quiz.

You can submit multiple times to gradescope. Only the last submission is graded.

DO NOT JUST PUT THE QUESTION INTO SYMBOLLAB OR OTHER SIMILAR INTEGRAL CALCULATORS. I expect to see the work done in a clear and concise manner. Correct mathematical notation should be used.

1. (5 points) Evaluate $\int_C x^2 z ds$, where C is the line segment from $(0, 1, 1)$ to $(3, 0, 6)$.

2. (5 points) Evaluate $\int_C y dx + 3x^2 dy$, where C is the arc of the curve $y = 9 - x^2$ from the point $(3, 0)$ to $(0, 9)$

Quiz 1 Key.

1)

$$r(t) = (1-t) \langle 0, 1, 1 \rangle + t \langle 3, 0, 6 \rangle$$

$$= \langle 0, 1-t, 1-t \rangle + \langle 3t, 0, 6t \rangle$$

$$= \langle 3t, 1-t, 1+5t \rangle \quad 0 \leq t \leq 1$$

$$r' = \langle 3, -1, 5 \rangle$$

$$|r'| = \sqrt{9 + 1 + 25} = \sqrt{35}$$

$$\int_C x^2 \, ds = \int_0^1 (3t)^2 (1+5t) \sqrt{35} \, dt$$

$$= \int_0^1 9t^2 (1+5t) \sqrt{35} \, dt = \sqrt{35} \int_0^1 9t^2 + 45t^3 \, dt$$

$$= \sqrt{35} \left(3t^3 + \frac{45t^4}{4} \right) \Big|_0^1 = \sqrt{35} \left(3 + \frac{45}{4} - (0) \right) = \left(\frac{12}{4} + \frac{45}{4} \right) \sqrt{35}$$

$$= \frac{57}{4} \sqrt{35}$$

$$2) \quad \begin{aligned} x &= t \\ y &= 9 - t^2 \end{aligned} \quad 0 \leq t \leq 3$$

Note:

This parametrization
is backwards
on the path.

Change sign at the
end

$$dx = 1 dt \quad dy = -2t dt$$

$$\int_C y dx + 3x^2 dy$$

$$= \int_0^3 (9 - t^2)(1) + 3(t)^2(-2t) dt$$

$$= \int_0^3 9 - t^2 - 6t^3 dt = \left(9t - \frac{t^3}{3} - \frac{6t^4}{4} \right) \Big|_0^3$$

$$= 27 - \frac{27}{3} - \frac{6 \cdot 81}{4} - (0)$$

$$= 27 - 9 - \frac{243}{2} = -\frac{207}{2}$$

$$\text{Answer!} \quad - \left(-\frac{207}{2} \right) = \frac{207}{2}$$

note: If you integrate from 3 to 0 then you don't have to change the sign
 $-1^3 = 1^0$