

## MATH 243 Quiz 1 Common Mistakes

**0.** Two students didn't upload all images, one student uploaded blurry 240 x 320 thumbnails, one student didn't upload any work at all, and two students didn't take the quiz. Two students who left the long answer questions blank didn't circle the final answers in their scratchwork. I was lenient this time, but missing or unclear work will be penalized more in the future.

One student had work which looked AI generated. I let it slide because I couldn't prove it, but if you keep doing it then I will scrutinize further and treat it as cheating.

**1.** One student mixed up  $\mathbf{w}$ ,  $\mathbf{u}$  and answered the question by considering each answer choice for  $\mathbf{u}$ . Everyone else got the question correct, but half the students did it only by eliminating the other answer choices or guessing. Many took the derivative to find  $\mathbf{w}$ , but were unable to proceed further because they did not recognize that  $\mathbf{r}'$ ,  $\mathbf{T}$  are parallel and  $\mathbf{T}'$ ,  $\mathbf{N}$  are parallel. Some computed  $\mathbf{w} \cdot \mathbf{N}$  by doing  $(\mathbf{a} \times \mathbf{b}) \cdot \mathbf{c} = \mathbf{a} \times (\mathbf{b} \cdot \mathbf{c})$ , which is illegal since  $\mathbf{a}$  is a vector and  $\mathbf{b} \cdot \mathbf{c}$  is a scalar.

**2.** Students forgot about  $+\mathbf{c}$  for the integration option. Students reached  $\sqrt{t^4 + 4t + 4}$  for the magnitude option, but didn't simplify this to  $t^2 + 2$ . For the arc length option, many students computed  $\|\mathbf{s}\| = \|\mathbf{r}'\|$ , which finds the arc length for  $\mathbf{r}$ . To find the arc length for  $\mathbf{s}$ , you need to use  $\|\mathbf{s}'\|$ .

**3.** Almost all students reached  $\tan(\theta) = 2 + \sqrt{3}$ , but some were unable to finish because they didn't recognize the trig value  $\tan(75^\circ)$ . Some used a calculator for this and lost points because it's cheating.

**4.** Most who tried recognized the integration bounds are 0 to 1 and that  $\sqrt{(x')^2 + (y')^2 + (z')^2}$  needs to be computed. Some didn't finish computing and simplifying because they ran out of time working on other questions. A couple who computed and simplified correctly choked at the finish line by answering 4541 instead of 5441, mixing up the fractions.

**5.** There were some algebra mistakes when taking the derivative of  $\mathbf{T}$  or less commonly, finding the cross product for  $\mathbf{B}$ . A few students used the cross product formula for curvature instead of the formula with  $\mathbf{T}'$ , which drained their time since you have to redo work and then do extra work. Some students did everything perfectly, but ran out of time before they could find all of the values because they are either slow at algebra, or don't do it efficiently. Of those, some ignored or forgot a tip mentioned in class, that you can pull scalars out of magnitudes before computing them to speed up the process.

**6.** Almost everyone who did this problem, did it correctly. Two mistakes are not simplifying  $\cos^{-1}(1/2)$ , or mixing up the parts and writing something like  $x + y - z = 60^\circ$ . Since this was the last question on the quiz, some students ran out of time before reaching it.