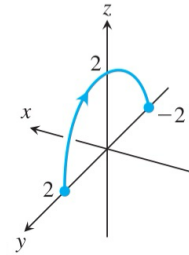


Quiz 4

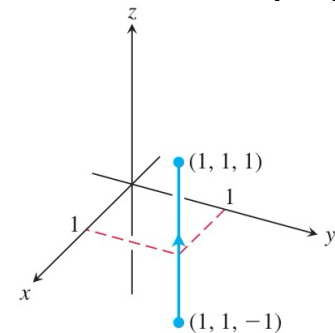
Be sure to follow the quiz instructions in order to avoid a deduction in points. Submissions are due in Gradescope by 11:59pm on Friday; no late work is accepted.

Name:

Question #1a: Find a parameterization for space curve C which is the the half circle in the yz -plane with $z \geq 0$ shown in the image. [AN]



Question #1b: Find a parameterization for space curve C which is the line segment from $(1, 1, -1)$ to $(1, 1, 1)$ shown in the image. [AN]



Question #1c: Suppose that the space curve C is parametrized by $\mathbf{r}(t) = \langle t, t^2, e^t \rangle$, $t \in [1, 3]$. Find (i) a re-parametrization $\mathbf{r}_1(t)$ for the curve C with the opposite orientation instead, and find (ii) a re-parametrization $\mathbf{r}_2(t)$ for the curve C where $t \in [0, 1]$ instead. [AN]

(i)

(ii)

Question #2: Given \mathbf{F} and C below, first (a) find a potential function for \mathbf{F} and then (b) evaluate the line integral $\int_C \mathbf{F} \cdot \mathbf{T} ds$ using the Fundamental Theorem of Line Integrals (FTOLI).

[AJN]

$$\mathbf{F} = \langle \cos(x - y), -\cos(x - y), 2z \rangle$$

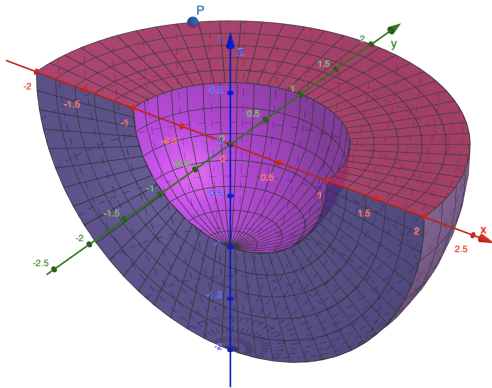
$$C : \mathbf{r}(t) = \left\langle \frac{\pi}{2}t, \frac{\pi}{4}t, t \right\rangle, t \in [0, 1].$$

$f =$

$\int_C \mathbf{F} \cdot \mathbf{T} ds =$

Question #3: Find the mass of the solid D pictured below, which occupies the region which is the lower-half of spherical shell between $\rho = 1$ and $\rho = 2$, with $y \geq 0$ and $z \leq 0$. First (a) find the coordinates of the point $P(-\sqrt{2}, \sqrt{2}, 0)$ in spherical coordinates (ρ, ϕ, θ) . Then (b) write a triple integral in spherical coordinates which computes the mass of D given the density function $\delta(x, y, z) = x^2 + y^2$ in the order $d\rho d\phi d\theta$, and then (b) evaluate the expression from part (b).

[AJN]



(a) $(-\sqrt{2}, \sqrt{2}, 0)_S =$

(b) mass =

(c) mass =