

Quiz 2

B Term, 2013

Show all work needed to reach your answers.

1. (10 points) Please find the velocity and speed if position is given by $c(t) = (2\pi, \int_2^t \sin u \, du)$.

High: 25
Median: 24
Low: 13

5 velocity: $\vec{v}(t) = \vec{c}'(t) = (0, \sin t)$

5 speed: $s'(t) = |\vec{v}(t)| = \sqrt{\sin^2 t} = |\sin t|$

2. (7 points) What integral represents the length of the curve C given by the parameterization $x = f(t)$, $y = g(t)$ running from $t = a$ to $t = b$? You may assume that f and g are differentiable.

↑ No absolute value (-1)

$$L(C) = \int_a^b \sqrt{(f'(t))^2 + (g'(t))^2} \, dt$$

3. (8 points) Please find an equation of the tangent line to the curve C traced by $u(t) = \langle t^2 - 1, t^3 - t \rangle$ at $t = 1$. *Any of those below will do.*

$\vec{u}'(t) = \langle 2t, 3t^2 - 1 \rangle \Rightarrow \vec{v} = \vec{u}'(1) = \langle 2, 2 \rangle$

$\vec{u}(t) = \langle t^2 - 1, t^3 - t \rangle \Rightarrow \vec{x}_0 = \vec{u}(1) = \langle 0, 0 \rangle$

$\left. \begin{array}{l} \text{So the line is given by } \vec{x}(t) = \vec{x}_0 + t\vec{v} = \langle 2t, 2t \rangle \\ \text{or parametrically by } \begin{cases} x(t) = 2t \\ y(t) = 2t \end{cases} \\ \text{or classically by } \underline{y = x} \end{array} \right\}$