

No calculators will be allowed and no partial credit will be given.

1. Find the derivative of the vector function $\vec{r}(t) = \langle \sin(t), 2\sqrt{t}, \tan(t) \rangle$
2. Find the derivative of the vector function $\vec{r}(t) = \langle \frac{3e^t}{2}, \ln(2t), t^2 + \frac{3}{t^2} \rangle$
3. A space curve C is described by the vector function $\vec{r}(t) = \langle t^2, \frac{t^2}{2}, t \rangle$. Find $\vec{T}(1)$, the unit tangent vector to C at the point corresponding to $t = 1$.
4. A space curve C is described by the vector function $\vec{r}(t) = \langle 2 \ln(t), 3\sqrt{t}, t^2 \rangle$. Find $\vec{T}(1)$, the unit tangent vector to C at the point corresponding to $t = 1$.
5. A space curve C is described by the vector function $\vec{r}(t) = \langle 2 \cos(t), 3 \sin(t), -3t \rangle$. Find $\vec{T}(-\pi)$, the unit tangent vector to C at the point corresponding to $t = -\pi$.
6. Express the indefinite integral $\int \langle 2 \cos(t), \frac{2}{t^3}, \cos(t) \rangle dt$ as a vector of elementary functions. Use the constant vector $\langle C1, C2, C3 \rangle$ to denote arbitrary constants of integration.
7. Express the indefinite integral $\int \langle t + \sqrt{t}, e^{2t}, \frac{3}{t} \rangle dt$ as a vector of elementary functions. Use the constant vector $\langle C1, C2, C3 \rangle$ to denote arbitrary constants of integration.
8. Find $\vec{r}(t)$ given $\vec{r}'(t) = \langle t^3, e^t, -2e^t \rangle$ and $\vec{r}(0) = \langle -1, 0, 4 \rangle$
9. Find $\vec{r}(t)$ given $\vec{r}'(t) = \langle \frac{2t}{t^2+1}, t^2 - t, -6 \rangle$ and $\vec{r}(0) = \langle -2, -2, 0 \rangle$
10. Find $\vec{r}(t)$ given $\vec{r}'(t) = \langle \sin(t), 0, 3 \cos(t) \rangle$ and $\vec{r}(\frac{\pi}{2}) = \langle 0, -2, 3 \rangle$

1. $\langle \cos(t), \frac{1}{\sqrt{t}}, (\sec(t))^2 \rangle$
2. $\langle \frac{3e^t}{2}, \frac{1}{t}, 2t - \frac{6}{t^3} \rangle$
3. $\langle \frac{2}{\sqrt{6}}, \frac{1}{\sqrt{6}}, \frac{1}{\sqrt{6}} \rangle$
4. $\langle \frac{4}{\sqrt{41}}, \frac{3}{\sqrt{41}}, \frac{4}{\sqrt{41}} \rangle$
5. $\langle 0, -\frac{1}{\sqrt{2}}, -\frac{1}{\sqrt{2}} \rangle$
6. $\langle 2 \sin(t), -\frac{1}{t^2}, \sin(t) \rangle + \langle C1, C2, C3 \rangle$
7. $\langle \frac{t^2}{2} + \frac{2t^{\frac{3}{2}}}{3}, \frac{e^{2t}}{2}, 3 \ln(|t|) \rangle + \langle C1, C2, C3 \rangle$
8. $\langle \frac{t^4}{4} - 1, e^t - 1, 6 - 2e^t \rangle$
9. $\langle \ln(t^2 + 1) - 2, \frac{t^3}{3} - \frac{t^2}{2} - 2, -6t \rangle$
10. $\langle -\cos(t), -2, 3 \sin(t) \rangle$