9. Find the point on \( x + 2y + 3z = 10 \) which is closest to \((1, 5, 9)\).

The point is \((-1, 1, 3)\).

10. Find the length of the curve whose position vector is

\[ \mathbf{r}(t) = t^2 \mathbf{i} - 2t^3 \mathbf{j} + 6t^3 \mathbf{k}, \]

for \( 0 \leq t \leq 1 \).

\[
\text{length} = \int_{0}^{1} \left\| \mathbf{r}'(t) \right\| \, dt = \int_{0}^{1} \sqrt{2t^2 - 6t^2 + 18t^2} \, dt = \int_{0}^{1} \sqrt{2t^2 - 3t^2 + 9t^2} \, dt = \int_{0}^{1} \sqrt{9t^2} \, dt = \int_{0}^{1} 3t \, dt = \left[ \frac{3}{2} t^2 \right]_{0}^{1} = \frac{3}{2},
\]

\(
= \frac{1}{90} \left( \frac{3}{2} \right)^{\frac{3}{2}} \right)^{91}
\]

\(= \frac{2}{270} \left( (91)^{\frac{3}{2}} - 1 \right)\).