Esercizi di Cinematica

Tracce

1. $$\begin{cases} \ddot{s}(t) = \dfrac{1+t+t^2}{t+t^3} \\ s(1) = 0 \\ \dot{s}(1) = 0 \end{cases}$$

2. $$\begin{cases} \ddot{s}(t) = (-1+e)\,e^t \\ s(0) = 0 \\ \dot{s}(0) = 0 \end{cases}$$

3. $$\begin{cases} \ddot{s}(t) = \dfrac{1}{2\sqrt{1+t}} \\ s(0) = 0 \\ \dot{s}(0) = 0 \end{cases}$$

4. $$\begin{cases} \ddot{s}(t) = -\dfrac{t}{\sqrt{1-t^2}} \\ s(0) = 0 \\ \dot{s}(0) = 0 \end{cases}$$

5. $$\begin{cases} \ddot{s}(t) = \cos t^2 - 2t^2 \sin t^2 \\ s(0) = 0 \\ \dot{s}(0) = 0 \end{cases}$$

6. $$\begin{cases} \ddot{s}(t) = \cos t \\ s(0) = 0 \\ \dot{s}(0) = 0 \end{cases}$$

7. $$\begin{cases} \ddot{s}(t) = \sin 3t \\ s(0) = 0 \\ s(1) = 0 \end{cases}$$

8. $$\begin{cases} \ddot{s}(t) = 2t^2 e^{-3t} \\ s(0) = 0 \\ \dot{s}(0) = 1 \end{cases}$$

9. $$\begin{cases} \ddot{s}(t) = 2te^{-2t+1} \\ s(0) = 0 \\ \dot{s}(0) = 0 \end{cases}$$

10.

$$\begin{cases} \ddot{s}(t) = \dfrac{2t}{(1+t^2)^2} \\ s(0) = 0 \\ \dot{s}(0) = 0 \end{cases}$$

11.

$$\begin{cases} \ddot{s}(t) = \dfrac{1}{1+t} \\ s(0) = 0 \\ s(1) = 1 \end{cases}$$

Soluzioni

1. $$s(t) = \frac{1}{4}\left(4 - 4t - \pi t + 4t \arctan t + \log 4 + 4t \log t - 2 \log\left(1 + t^2\right)\right)$$

2. $$s(t) = (-1 + e)\left(-1 + e^t - t\right)$$

3. $$s(t) = \frac{1}{3}\left(-2 - 3t + 2\sqrt{1+t} + 2t\sqrt{1+t}\right)$$

4. $$s(t) = \frac{1}{2}\left(t\left(-2 + \sqrt{1 - t^2}\right) + \arcsin t\right)$$

5. $$s(t) = \frac{1}{2}\sin t^2$$

6. $$s(t) = 1 - \cos t$$

7. $$s(t) = \frac{1}{9}\left(t \sin 3 - \sin 3t\right)$$

8. $$s(t) = \frac{1}{27}e^{-3t}\left(4 + 8t + 6t^2 + e^{3t}\left(-4 + 31t\right)\right)$$

9. $$s(t) = \frac{1}{2}e^{1-2t}\left(1 + e^{2t}\left(-1 + t\right) + t\right)$$

10. $$s(t) = t - \arctan t$$

11. $$s(t) = t - t \log 4 + (1 + t) \log (1 + t)$$