

Team Challenge
Answers

① $e^x - 3\ln(e^x + 1) + C$

② a) III

b)

$$\left. \frac{dy}{dx} \right|_{(2,-1)} = 1 - 16\ln 2, \quad \left. \frac{dy}{dx} \right|_{(2,-3)} = -3 + 16\ln 2$$

③ a) $1 - \frac{1}{3}x + \frac{2}{9}x^2 - \frac{14}{81}x^3 + O(x^4)$

b) $1 - \frac{1}{4}x + \frac{1}{8}x^2 - \frac{7}{96}x^3 + O(x^4)$

c) $4 - x + \frac{1}{2}x^2 - \frac{7}{24}x^3 + O(x^4)$

④ $A=1, B=2, C=4, \frac{1}{3} - \ln 6$

⑤ $\frac{1}{2}, e^2 + 1$

⑥ $\frac{1}{2}e^{x^2}(x^2 - 1) + C$

⑦ $(2x-1)^2 + 4(2x-1) + 2\ln|2x-1| + C = 4x^2 + 4x + 2\ln|2x-1| + C$

⑧ $\cos x + \ln(1 - \cos x) + C$

⑨ a) $h_{\max} \approx 42.91 \text{ m}$ b) 5 c) speed $\approx 40.82 \text{ ms}^{-1}$, $\approx 45.3^\circ$ to the ground

⑩ $x = \frac{35}{3}$