

Quiz 3

This quiz is graded out of 10 marks. No books, calculators, notes or cell phones are allowed. You must show all your work, the correct answer is worth 1 mark the remaining marks are given for the work. If you need more space for your answer use the back of the page.

Question 1. §23.4 #27 (4 marks) The distance s (in m) above the ground for a projectile fired vertically upward with a velocity of 44.0 m/s as a function of time t (in s) is given by $s = 44.0t - 4.90t^2$. Find t for $v = 0$.

$$\begin{aligned} v &= s' \\ &= (44.0t - 4.90t^2)' \\ &= 44.0 - 9.80t \end{aligned}$$

$$\begin{aligned} 0 &= v \\ 0 &= 44.0 - 9.80t \\ t &= \frac{44.0}{9.80} = 4.49 \text{ s} \end{aligned}$$

Question 2. §23.5 #19 (3 marks) Find the derivative of each of the functions.

$$y = \frac{1}{3}x^3 + \frac{1}{2}x^2 - \frac{1}{x} = \frac{1}{3}x^3 + \frac{1}{2}x^2 - x^{-1}$$

$$\begin{aligned} y' &= \frac{3}{3}x^2 + \frac{2}{2}x + \frac{1}{x^2} \\ &= x^2 + x + \frac{1}{x^2} \end{aligned}$$

$$\begin{aligned} &= \frac{4x^4 + 8x^3 - x^3 - 2x^2 - 6x^4 + 3x^3 + 3x^2 - 8x^3 + 4x^2 + 4x}{(x^2(x+2))^2} \\ &= \frac{-2x^4 + 2x^3 + 5x^2 + 4x}{x^4(x+2)^2} \\ &= \frac{-2x^3 + 2x^2 + 5x + 4}{x^3(x+2)^2} \end{aligned}$$

Question 3. §23.6 #23 (3 marks) Find the derivative of each of the functions.

$$y = \frac{2x^2 - x - 1}{x^3 + 2x^2}$$

$$\begin{aligned} y' &= \frac{(2x^2 - x - 1)'(x^3 + 2x^2) - (x^3 + 2x^2)'(2x^2 - x - 1)}{(x^3 + 2x^2)^2} \\ &= \frac{(4x - 1)(x^3 + 2x^2) - (3x^2 + 4x)(2x^2 - x - 1)}{(x^3 + 2x^2)^2} \end{aligned}$$