

## Week 2 Questions and Answer Key

- Day 2, questions 1-4
- Day 3, questions 5-8
- Day 4, questions 9-12
- Day 5, questions 13-18

1.  $y = x^2(2x + 1)$        $\frac{dy}{dx} = 6x^2 + 2x$

2.  $y = (2x + 3)(5x - 4)$        $\frac{dy}{dx} = 20x + 7$

3.  $y = (x^2 + 3x + 4)(x^3 - 4x)$        $\frac{dy}{dx} = 5x^4 + 12x^3 - 24x - 16$

4. Find  $f'_2$  when  $f_x = (x^2 - 4x + 3)(x^3 - 5x)$        $f'_2 = -7$

5.  $y = \frac{(x-1)}{(x^2+x+1)}$        $\frac{dy}{dx} = \frac{-x^2+2x+2}{(x^2+x+1)^2}$

6.  $y = \frac{4x^2+9}{3x^3-4x^2}$        $\frac{dy}{dx} = \frac{-12x^4-81x^2+72x}{(3x^3-4x^2)^2}$

7.  $y = \frac{3x-1}{2x+4}$        $\frac{dy}{dx} = \frac{14}{(2x+4)^2}$  OR  $\frac{7}{2(x+2)^2}$

8. Find  $f'_{-1}$  when  $f_x = \frac{3x-4}{x+2}$        $f'_{-1} = -10$

9.  $y = x^3(x^3 - x)^3$        $\frac{dy}{dx} = (12x^5 - 6x^3)(x^3 - x)^2$

10.  $y = (3x + 4)^{\frac{3}{4}}(4x^2 + 8)$        $\frac{dy}{dx} = \frac{33x^2+32x+18}{(3x+4)^{\frac{1}{4}}}$

11.  $y = \frac{(x^3+2)^4}{4x^2-3x}$        $\frac{dy}{dx} = \frac{(x^3+2)^3(40x^4-33x^3-16x+6)}{(4x^2-3x)^2}$

12.  $y = \frac{(3x+2)^5}{(2x-1)^3}$        $\frac{dy}{dx} = \frac{(3x+2)^4(12x-27)}{(2x-1)^4}$

13. Find the slope of the line tangent to the curve  $y = \frac{x-3}{2-5x}$  at the point  $(2, \frac{1}{8})$ .  
 $m_{tan} = \frac{-13}{64}$

14. Find the equation of the tangent line at the given point in the previous question.

$$y = \frac{-13x}{64} + \frac{17}{32}$$

15.  $4x + 3y = 7$        $y' = \frac{-4}{3}$

16.  $x^2 - y^2 = 9$        $y' = \frac{x}{y}$

17.  $y^4 - y^2x + x^2 = 0$        $y' = \frac{y^2 - 2x}{4y^3 - 2xy}$

18.  $3x^2y^2 + 4y^5 + 8x^2y^3 + xy = 5$        $y' = \frac{-6xy^2 - 16xy^3 - y}{6x^2y + 20y^4 + 24x^2y^2 + x}$