

1. Hint: with  $x = 4$ , one has

$$f(x+h) - f(x) = \frac{1}{x+h-3} - \frac{1}{x-3} = \frac{-h}{(x+h-3)(x-3)}$$

2.  $-\frac{6}{t^4} + \frac{1}{t^2} + 16t$

3.  $-\frac{1}{2u^{3/2}} - \frac{3}{2\sqrt{u}}$

4.  $\theta^2(3\cos(\theta) - \theta\sin(\theta))$

5.  $\frac{7 - 2t - 3t^2 - 2t^3 + t^4}{(1 - 3t + t^3)^2}$

6.  $\frac{2x+3}{2\sqrt{x^2+3x-1}}$

7.  $-4\cot^3(u)\csc^2(u)$

8.  $y = 11x - 39$

9.  $-\frac{3}{\pi^2} \sin\left(\frac{t-1}{\pi}\right)$

10.  $-1$ , using  $y'(x) = \frac{-2xy + y^2 + 2}{x^2 - 2xy}$