

1. Evaluate the difference quotient for the given function. Simplify your answer.

$$f(x) = x^2 - 4x + 5 \quad \frac{f(x+h) - f(x)}{h}$$

2. Find the domain of the following functions.

(a) $f(x) = \frac{x+6}{x^2-3x-4}$

(b) $f(x) = \sqrt{3 - \sqrt{x}}$

(c) $g(x) = \sqrt[3]{x-8}$

3. Find $g \circ f$ and $f \circ g$ and their domains.

$$g(x) = \sqrt{x+3} \quad f(x) = x + \frac{1}{x}$$

4. Find two functions $f(x)$ and $g(x)$ such that $(f \circ g)(x) = x^2 + 4x + 2$

5. If a ball is thrown into the air with a velocity of 40 ft/s , its height in feet t seconds later is given by $y = 40t - 16t^2$. Find the average velocity for the time period beginning when $t = 2$ and lasting

- (i) 0.5 seconds
- (ii) 0.1 seconds
- (iii) 0.05 seconds
- (iv) 0.01 seconds

Then, estimate the instantaneous velocity when $t = 2$.

6. A tank holds 1000 gallons of water, which drains from the bottom of the tank in half an hour. The values in the following table show the volume V of the water remaining in the tank (in gallons) after t minutes.

t	V
5	694
10	444
15	250
20	111
25	28
30	0

If P is the point $(15, 250)$ on the graph of V , find the slopes of the secant lines PQ when Q is a point on the graph with $t = 10$ and $t = 20$. Use these to estimate the slope of the tangent line at P by averaging the slopes of the two secant lines.