

1. The difference quotient (i.e. slope) between two points $(a, f(a))$ and $(a + h, f(a + h))$ on a curve $f(x)$ is $\frac{f(a + h) - f(a)}{(a + h) - a} = \frac{f(a + h) - f(a)}{h}$.

For $f(x) = 4x^2 - 3x + 7$, simplify the difference quotient for $a = 2$.

2. Let $f(x) = \frac{5x^2 - 3x - 14}{x^2 - 4}$, what is the value of f as x approaches 2?

3. Let $g(x) = \frac{x - 1}{\sqrt{x} - 1}$, what is the value of g as x approaches 1?

4. Simplify: $h(x) = \frac{x^8 - 3\sqrt{x} + 2}{\sqrt{x}}$

5. Write in the form x^n where n is a rational number: $\sqrt[7]{x^4}$

6. How many constant terms does $k(x)$ have?

$$k(x) = 3x^\pi + \pi + \sqrt{3} + e^2 + \pi x + e^2 x + e^2 x^3 + 5$$

7. Given $m(x) = \begin{cases} x^2 - 4 & \text{if } x < 3 \\ 0 & \text{if } x = 3 \\ x + 2 & \text{if } x > 3 \end{cases}$

Find:

A. $m(3)$

B. $m(-3)$

C. $m(5)$

8. Given $n(x) = \frac{3x^2 + 13x - 10}{x^2 - 25}$

Find:

A. The vertical asymptote(s) of n .

B. The horizontal asymptote(s) of n .