Difference Quotient Practice
Math 130 *Kovitz*

For early tests, problems 1 to 5 are necessary.

For the final exam, all 9 will be considered.

If planning to continue in Math 140 or Math 145, once you can do problems 1 to 5 correctly and smoothly, practice the rest either alone, with your study buddy, or with our FSG tutor.

1. Let the f be function with the rule $f(x) = x^2 - x + 1$.

   Find $\dfrac{f(x + h) - f(x)}{h}$.

2. Let the f be function with the rule $f(x) = 17x^2 - 13x$.

   Find $\dfrac{f(x + h) - f(x)}{h}$.

3. Let the f be function with the rule $f(t) = -16t^2 + 9t + 10$.

   Find $\dfrac{f(t + h) - f(t)}{h}$.

4. Let the g be function with the rule $g(x) = 3x^2 - 5x + 1$.

   Find $\dfrac{g(2 + h) - g(2)}{h}$.

5. Let the h be function with the rule $h(x) = 7x^2 - 11x + 3$.

   (a) Find $\dfrac{h(x + \frac{1}{2}) - h(x)}{1/2}$.

   (b) Find $\dfrac{h(x + 0.01) - h(x)}{0.01}$.

6. Let the f be function with the rule $f(x) = \dfrac{1}{x}$.

   Find and simplify $\dfrac{f(x + h) - f(x)}{h}$.

7. Let the g be function with the rule $g(x) = \sqrt{x}$.

   Find $\dfrac{g(x + h) - g(x)}{h}$.

   Then rationalize the numerator and simplify to a single fraction with 1 in the numerator.

8. Let the g be function with the rule $g(x) = \dfrac{1}{x + 2}$.

   Find and simplify to a single fraction: $\dfrac{g(a + 4) - g(a)}{4}$.

9. Let the f be function with the rule $f(x) = 3(x - 4)^2 - 11$.

   Find $\dfrac{f(a + h) - f(a)}{h}$.

Answers below

Answers

1. $2x - 1 + h$

2. $34x - 13 + 17h$

3. $-32t + 9 - 16h$

4. $3h + 7$

5. (a) $14x - \frac{15}{2}$ or $14x - 7.5$

    (b) $(14x - 11) + 0.07$ or $14x - 10.93$

6. $-\dfrac{1}{x(x + h)}$

7. $\dfrac{1}{\sqrt{x + h} + \sqrt{x}}$

8. $-\dfrac{1}{(a + 6)(a + 2)}$

9. $6a - 24 + 3h$

Multiplying out the parentheses to get the function f into general form before using it to find $f(a + h)$ and $f(a)$ will greatly simplify the algebra in problem 9.