Answers to diff. quot #1

Difference Quotient Practice 1 | Precalculus/Trig | Name _____ Period _____

Find the Difference Quotient and simplify the answer for each of the following functions.

1. $f(x)=3x^2-4x+2$

$$\frac{3(x+h)^2-4(x+h)+2-(3x^2-4x+2)}{h}$$

$$\frac{3(x^2+2xh+h^2)-4x-4h+2-3x^2+4x-2}{h}$$

$$\frac{\cancel{3x^2}+6xh+3h^2-\cancel{4x}-4h+\cancel{2}-\cancel{3x^2}+\cancel{4x}-\cancel{2}}{h}$$

$$\frac{3h^2+6xh-4h}{h}=6x-4+3h$$

2. $f(x)=\sqrt{3x-5}$

$$\frac{\sqrt{3(x+h)-5}-\sqrt{3x-5}}{h}$$

NOTE:
$(a+b)(a-b)=a^2-b^2$

$$\frac{(\sqrt{3x+3h-5}-\sqrt{3x-5})(\sqrt{3x+3h-5}+\sqrt{3x-5})}{h(\sqrt{5x+3h-5}+\sqrt{3x-5})}$$

$$\frac{\cancel{3x}+\cancel{3h}-\cancel{5}-(\cancel{3x}-\cancel{5})}{\cancel{h}(\sqrt{3x+3h-5}+\sqrt{3x-5})}=$$

$$\frac{3}{\sqrt{3x+3h-5}+\sqrt{3x-5}}$$

3. $f(x)=\dfrac{5}{3x-2}$

$$\frac{\frac{(3x-2)\,5}{(3x-2)\,(3(x+h)-2)}-\frac{5}{3x-2}\left(\frac{3(x+h)-2}{3(x+h)-2}\right)}{h}$$

$$\frac{\frac{\cancel{15x}-\cancel{10}-\cancel{15x}-15h+\cancel{10}}{(3x-2)(3x+3h-2)}}{h}$$

$$=$$

$$\frac{-15\cancel{h}}{\cancel{h}(3x-2)(3x+3h-2)}\quad\frac{-15}{(3x-2)(3x+3h-2)}$$

4. $f(x)=2x^2-3x-5$

$$\frac{2(x+h)^2-3(x+h)-5-2x^2+3x+5}{h}$$

$$\frac{2(x^2+2xh+h^2)-3x-3h-2x^2+3x}{h}$$

$$\frac{\cancel{2x^2}+4xh+2h^2-\cancel{3x}-3h-\cancel{2x^2}+\cancel{3x}}{h}$$

$$\frac{4xh+2h^2-3h^2}{h}$$

$$4x+2h-3$$

$$4x+2h-3$$

5. $f(x)=\sqrt{4x+3}$

$$\frac{\sqrt{4(x+h)+3}-\sqrt{4x+3}}{h}$$

$$\frac{(\sqrt{4x+4h+3}-\sqrt{4x+3})(\sqrt{4x+4h+3}+\sqrt{4x+3})}{h(\sqrt{4x+4h+3}+\sqrt{4x+3}}$$

$$\frac{\cancel{4x}+4h+\cancel{3}-\cancel{4x}-\cancel{3}}{\cancel{h}(\sqrt{4x+4h+3}+\sqrt{4x+3})}$$

$$\frac{4\cancel{h}}{\cancel{h}(\sqrt{4x+4h+3}+\sqrt{4x+3})}$$

$$\frac{4}{\sqrt{4x+4h+3}+\sqrt{4x+3}}$$

6. $f(x)=\dfrac{3}{2x+5}$

$$=\frac{\frac{3}{2(x+h)+5}-\frac{3}{2x+5}}{h}$$

$$\frac{\frac{3(2x+5)-3(2x+2h+5)}{(2x+5)(2x+2h+5)}}{\cancel{h}}$$

$$\frac{\cancel{6x}+\cancel{15}-\cancel{6x}-6\cancel{h}-\cancel{15}}{\cancel{-6}}$$

$$\frac{-6}{(2x+5)(2x+2h+5)}$$