Section 1.1 Precalculus Name _____

Worksheet Period _____

1. Write the equation of the line containing the points $(-2,5)$ and $(4,-2)$ in <u>point-slope form.</u>

$\frac{5--2}{-2-4} = \frac{7}{-6}$

$y-5 = \frac{-7}{6}(x+2)$

or $y+2 = \frac{-7}{6}(x-4)$

2. Write an equation that is <u>parallel</u> to $3x+4y=8$ and passes through $(-2,5)$

$m = -\frac{3}{4}$

$y-5 = -\frac{3}{4}(x+2)$

Change to Standard:

$y-5 = -\frac{3}{4}x - \frac{3}{2}$

$\frac{3}{4}x + y = 5 - \frac{3}{2}$

$4 \cdot \frac{3}{4}x + y = \frac{7}{2} \cdot 4$

$3x + 4y = 14$

3. Write an equation that is <u>perpendicular</u> to $3x-4y=12$ and passes through $(-1,1)$

$m = \frac{3}{4}$ $\perp m = -\frac{4}{3}$

$y-1 = -\frac{4}{3}(x+1)$

$y-1 = -\frac{4}{3}x - \frac{4}{3}$

$3 \cdot \frac{4}{3}x + y = -\frac{1}{3} \cdot 3$

$4x + 3y = -1$

Difference Quotient Practice 2 | Precalculus/Trig | Name _____ Period _____

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

h = very short distance from x

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

1. $f(x)=5x^2+7x-6$

$$\frac{5(x+h)^2+7(x+h)-6-(5x^2+7x-6)}{h}$$

$$\frac{5(x^2+2xh+h^2)+7x+7h-6-5x^2-7x+6}{h}$$

$$\frac{\cancel{5x^2}+10xh+5h^2+\cancel{7x}+7h-\cancel{6}-\cancel{5x^2}-\cancel{7x}+\cancel{6}}{h}$$

$$\frac{10xh+5h^2+7h}{h}$$

$$\frac{h(10x+7+5h)}{h}$$

$10x+7+5h$

$10x+7+5h$

first the derivative of $5x^2+7x+6$ is $10x+7$

2. $f(x)=\sqrt{6x-2}$

$$\frac{\left(\sqrt{6(x+h)-2}-\sqrt{6x-2}\right)}{h}\frac{\left(\sqrt{6(x+h)-2}+\sqrt{6x-2}\right)}{\left(\sqrt{6(x+h)-2}+\sqrt{6x-2}\right)}$$

$$\frac{6(x+h)-2-(6x-2)}{h\left(\sqrt{\cancel{6x^2+12xh+6h^2-2+2-6x}}+\sqrt{6x-2}\right)}$$

$$\frac{\cancel{6x}+6\cancel{h}\cancel{-2}\cancel{-6x}\cancel{+2}}{\cancel{h}\left(\sqrt{6x+6h-2}+\sqrt{6x-2}\right)}=\frac{6}{\sqrt{6(x+h)-2}+\sqrt{6x-2}}$$

3. $f(x)=\dfrac{-2}{8x+9}$

$$\frac{\frac{(8x+9)}{(8x+9)}\cdot\frac{-2}{(8(x+h)+9)}-\frac{-2}{(8x+9)}\frac{(8x+8h+9)}{(8x+8h+9)}}{h}$$

$$\frac{-16x-18-(-16x-16h-18)}{h(8x+9)(8x+8h+9)}$$

$$\frac{-\cancel{16x}-\cancel{18}+\cancel{16x}+16h+\cancel{18}}{\cancel{h}(8x+9)(8x+8h+9)}=\frac{16}{(8x+9)(8x+8h+9)}$$

4. $f(x)=-2x^2+6x-3$

$$\frac{-2(x+h)^2+6(x+h)-3-(-2x^2+6x-3)}{h}$$

$$\frac{-2(x^2+2xh+h^2)+6x+6h-3+2x^2-6x+3}{h}$$

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

$$\frac{-4xh-2h^2+6h}{h}=\frac{\cancel{h}(-4x-2h+6)}{\cancel{h}}$$

$-4x+6-2h$

1st derivative

5) $f(x)=\sqrt{7x-5}$

$$\frac{\sqrt{7(x+h)-5}-\sqrt{7x-5}}{h}\frac{\left(\sqrt{7(h+x)-5}+\sqrt{7x-5}\right)}{\left(\sqrt{7(x+h)-5}+\sqrt{7x-5}\right)}$$

$$\frac{\cancel{7x}+7\cancel{h}\cancel{-5}-(\cancel{7x}\cancel{-5})}{\cancel{h}\left(\sqrt{7(x+h)-5}+\sqrt{7x-5}\right)}=\frac{7}{\sqrt{7(x+h)-5}+\sqrt{7x-5}}$$

6) $f(x)=\dfrac{8}{3x-4}$

$$\frac{\frac{(3x-4)}{(3x-4)}\frac{8}{(3x+3h-4)}-\frac{8}{(3x-4)}\frac{(3x+3h-4)}{(3x+3h-4)}}{h}$$

$$\frac{24x-32-(24x+24h-32)}{h(3x-4)(3x+3h-4)}$$

$$\frac{\cancel{24x}\cancel{-32}\cancel{-24x}\cancel{+32}-24h}{h(3x-4)(3x+3h-4)}$$

$$\frac{-24\cancel{h}}{\cancel{h}(3x-4)(3x+3h-4)}$$

$$\frac{24}{(4-3x)(3x+3h-4)}$$

Difference Quotient Practice 3 | Precalculus/Trig | Name _____ Period _____

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

1. $f(x) = 2x^2 - 4x - 9$

$$\frac{2(x+h)^2 - 4(x+h) - 9 - (2x^2 - 4x - 9)}{h}$$

$$\frac{2(x^2+2xh+h^2) - 4x - 4h - 9 - 2x^2 + 4x + 9}{h}$$

$$\frac{\cancel{2x^2} + 4xh + 2h^2 \cancel{- 4x} - 4h \cancel{- 9} \cancel{- 2x^2} \cancel{+ 4x} \cancel{+ 9}}{h}$$

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

$$= \boxed{4x - 4 + 2h}$$ 1st deriv.

2. $f(x) = \sqrt{5x - 6}$

$$\frac{\left(\sqrt{5(x+h) - 6} - \sqrt{5x-6}\right)}{h} \frac{\left(\sqrt{5(x+h) - 6} + \sqrt{5x-6}\right)}{\left(\sqrt{5(x+h) - 6} + \sqrt{5x-6}\right)}$$

$$\frac{\cancel{5x} + 5h \cancel{- 6} - (\cancel{5x} \cancel{- 6})}{h\left(\sqrt{5x+5h-6} + \sqrt{5x-6}\right)} = \frac{5\cancel{h}}{\cancel{h}\left(\sqrt{5x+5h-6} + \sqrt{5x-6}\right)}$$

$$= \boxed{\frac{5}{\sqrt{5x+5h-6} + \sqrt{5x-6}}}$$

3. $f(x) = \dfrac{-3}{4x-2}$

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

$$\frac{\cancel{-12x} \cancel{+6} \cancel{+12x} + 12h \cancel{-6}}{\cancel{h}(4x-2)(4x+4h-2)}$$

$$\boxed{\frac{12}{(4x-2)(4x+4h-2)}}$$

4) $f(x) = -2x^2 + 6x - 3$

$$\frac{-2(x+h)^2 + 6(x+h) - 3 - (-2x^2 + 6x - 3)}{h}$$

$$\frac{-2(x^2+2xh+h^2) + 6x + 6h - 3 + 2x^2 - 6x + 3}{h}$$

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

$$\frac{-4xh + 6h - 2h^2}{h} = \frac{\cancel{h}(-4x + 6 - 2h)}{\cancel{h}}$$

$$= \boxed{-4x + 6 - 2h}$$ 1st deriv.

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

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

$$\frac{\cancel{3x} + 3h \cancel{- 2} - (\cancel{3x} \cancel{- 2})}{\cancel{h}\left(\sqrt{3x+3h-2} - \sqrt{3x-2}\right)}$$

$$\boxed{\frac{3}{\sqrt{3x+3h-2} - \sqrt{3x-2}}}$$

6) $f(x) = \dfrac{4}{2x-5}$

$$\frac{\frac{(2x-5)\ 4}{(2x-5)(2x+2h-5)} - \frac{4\ (2x+2h-5)}{(2x-5)(2x+2h-5)}}{h}$$

$$\frac{\cancel{8x} \cancel{- 20} \cancel{- 8x} - 8h \cancel{+ 20}}{\cancel{h}(2x-5)(2x+2h-5)}$$

$$\frac{-8}{(2x-5)(2x+2h-5)} = \boxed{\frac{8}{(5-2x)(2x+2h-5)}}$$