5'20

H – Math 3

Please show all work!

Let $f(x) = 1 - 2x^2$ and $g(x) = -x - 4$. Find the indicated values.

1. $g(a+1) - g(a)$

$-(a+1)-4-(-a-4)$

$-a-1-4+a+4 = \boxed{-1}$

2. $f(a+1) - f(a)$

$1-2(a+1)^2-(1-2a^2)$

$1-2(a^2+2a+1)-1+2a^2$

$1-2a^2-4a-2-1+2a^2$

$\boxed{-4a-2}$

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

$$\frac{1-2(x+h)^2-(1-2x^2)}{h}$$

$$\frac{1-2(x^2+2xh+h^2)-1+2x^2}{h}$$

$$= 1-2x^2-4xh-2h^2+1+2x^2$$

$$= \frac{-4xh-2h^2}{h}$$

$$= \boxed{-4x-2h}$$

4. $\frac{g(x+h)-g(x)}{h}$

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

$$\frac{-x-h-4+x+4}{h} = \frac{-h}{h} = \boxed{-1}$$

Give the domain of each function.

5. $f(x) = -3|x-4| + 5$

$\{x \mid x = \mathbb{R}\}$

6. $f(x) = \sqrt{1-3x}$

$1-3x \geq 0$

$\frac{1}{3} \geq \frac{3x}{3}$

$\{x \mid x \leq \frac{1}{3}\}$

7. $f(x) = \frac{2x}{x^2+2x-15}$

$(x-3)(x+5)$

$\{x \mid x \neq 3, -5\}$

8. $f(x) = \frac{2}{\sqrt{x+3}}$

$x+3 > 0$

$\{x \mid x > -3\}$