) Find the domain for:

a) $g(x) = \dfrac{\sqrt{x+3}}{\sqrt{x^2-10x+24}}$ (interval notation)

b) $f(x) = \log_5 5x + 2$

2) Given $f(x) = x^3 - 8x$

Find $\dfrac{f(x+h) - f(x)}{h}$; $h \neq 0$

1)

a) $g(x) = \dfrac{\sqrt{x+3}}{\sqrt{x^2-10x+24}}$

$x+3 \geq 0$

$x \geq -3$

(domain in interval notation)

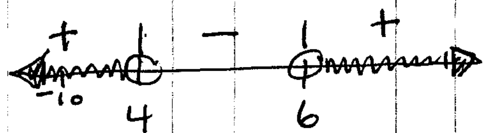
$x^2 - 10x + 24 > 0$

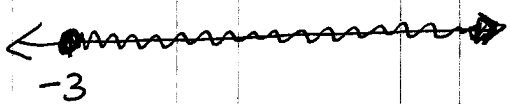
$(x-6)(x-4) > 0$

$(x-6)(x-4) = 0$

$x = 6 \quad x = 4$

odd odd





What's true for both parts?

$\boxed{[-3, 4) \cup (6, \infty)}$

b) $f(x) = \log_5 5x + 2$ (domain in set)

$5x > 0$

$x > 0$

$\boxed{\{x \mid x > 0\}}$

2) given $f(x) = x^3 - 8x$

Find $\dfrac{f(x+h) - f(x)}{h}$; $h \neq 0$

$f(x+h) =$

$(x+h)^3 - 8(x+h)$

$1x^3 + 3x^2h + 3xh^2 + 1h^3 - 8x - 8h$

$$\frac{f(x+h) - f(x)}{h} = \frac{[x^3 + 3x^2h + 3xh^2 + h^3 - 8x - 8h] - [x^3 - 8x]}{h}$$

$$= \frac{\cancel{x^3} + 3x^2h + 3xh^2 + h^3 \cancel{- 8x} - 8h \cancel{- x^3} \cancel{+ 8x}}{h}$$

$$= \frac{\cancel{h}(3x^2 + 3xh + h^2 - 8)}{\cancel{h}}$$

$$= \boxed{3x^2 + 3xh + h^2 - 8 \; ; \; h \neq 0}$$