Quotients of Functions

Dec 20/2016

$$(f \div g)(x) = f(x) \div g(x)$$

Ex.1 Given $f = \{(1,5),(2,0),(4,-5),(5,11)\}$

$$g = \{(2,-4),(3,1),(5,0)\}$$

(a) determine the domain of *f*, *g*, and $(f \div g)$

(b) determine $(f \div g)$

(a) $D_f = \{1,2,4,5\}$ $D_g = \{2,3,5\}$

$D_{f \div g} = \{2, \cancel{5}\}$

$\frac{11}{0}$ undefined

(b) $f \div g = \{(2,0)\}$

Jan 7-8:29 AM

Note: Since g(x) is in the denominator, and we must avoid division by zero, the domain has an additional condition:

$$D_{f \div g} = D_f \cap D_g, g(x) \neq 0$$

Ex.2 Given $f(x) = x^2 + x - 6$ $D_f = \{x \in \mathbb{R}\}$

$g(x) = \sqrt{x+3}$ $D_g = \{x \in \mathbb{R} \mid x \geq -3\}$

determine $(f \div g)(x)$ and state the domain.

$\frac{f(x)}{g(x)} = \frac{x^2+x-6}{\sqrt{x+3}}$ $x+3 \geq 0$, $x \geq -3$, $x \neq -3$

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

$= \frac{(x+3)^1(x-2)}{(x+3)^{\frac{1}{2}}}$

$= \sqrt{x+3}\,(x-2)$

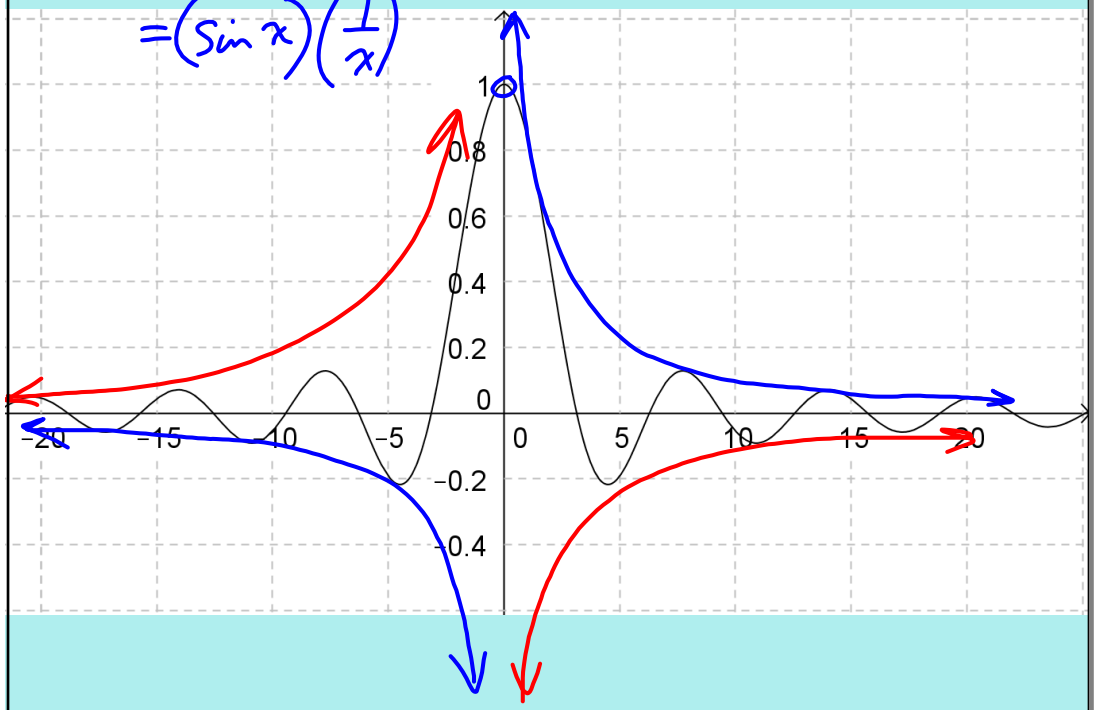
$\frac{a^1}{a^{\frac{1}{2}}} = a^{1-\frac{1}{2}} = a^{\frac{1}{2}} = \sqrt{a}$

$D_{f \div g} = \{x \in \mathbb{R} \mid x > -3\}$

Jan 6-8:57 AM

Example: $\frac{\sin x}{x}$ $D = \{x \in \mathbb{R} \mid x \neq 0\}$

$= (\sin x)\left(\frac{1}{x}\right)$



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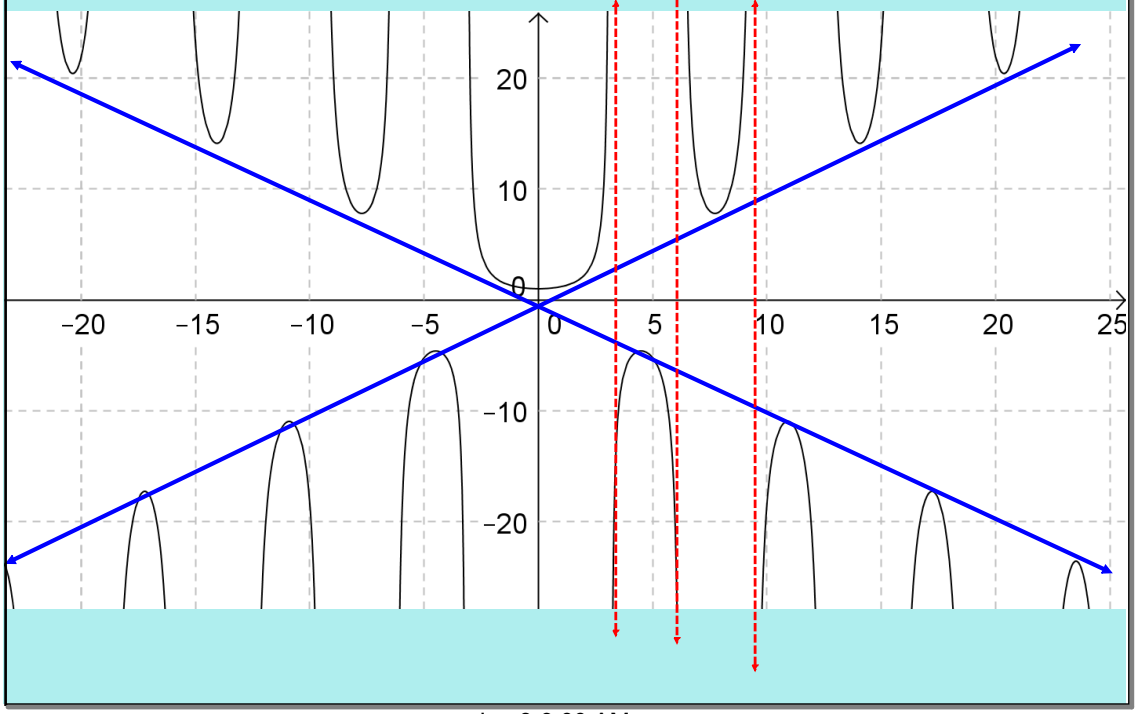
Example: $\frac{x}{\sin x}$ $D = \{x \in \mathbb{R} \mid x \neq n\pi, n \in \mathbb{Z}\}$



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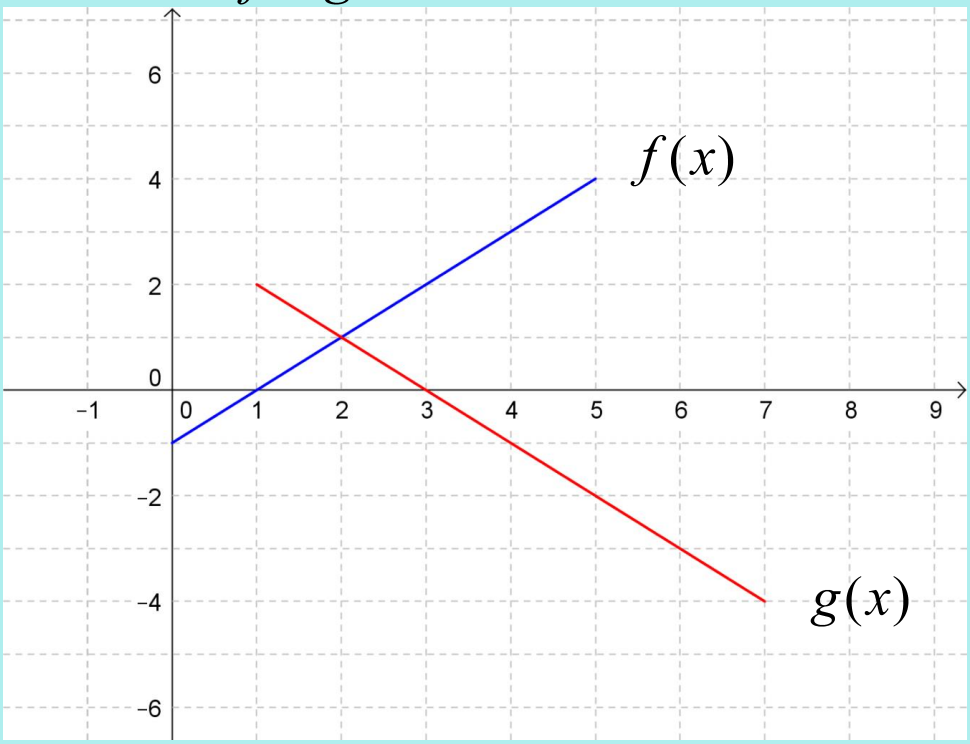
Ex.3 Graph $f \div g$



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Assigned Work:

p.542 # 1, 2, 3
p.544 # 3, 4, 6

Jan 6-9:35 AM