1a

$$\lg x = -1 + \lg 5$$

$$a^{b+c} = a^b \cdot a^c$$

$$10^{\lg x} = 10^{-1+\lg 5}$$

$$x = 10^{-1} \cdot 10^{\lg 5}$$

$$x = \frac{1}{10} \cdot 5 = \frac{1}{2}$$

1b

$$x - 1 \geq \frac{6}{x}$$

$$x - 1 - \frac{6}{x} \geq 0$$

$$\frac{(x-1)x}{x} - \frac{6}{x} \geq 0$$

$$\frac{x^2 - x - 6}{x} \geq 0$$

$$\frac{(x+2)(x-3)}{x} \geq 0$$

		-2		0		3	
$x+2$	−	0	+		+		+
$x-3$	−		−		−	0	+
x	−		−	0	+		+
$\frac{(x+2)(x-3)}{x}$	−	0	+	ej. det.	−	0	+

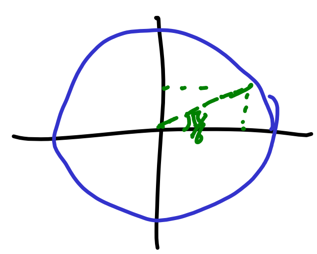
$-2 \leq x < 0$ eller $x \geq 3$

$$x \in [-2, 0[\cup [3, \infty[$$

2a

$$\sqrt{3}\sin(2x) - \cos(2x) = \sqrt{3}$$

$$\boxed{\sqrt{(\sqrt{3})^2 + (-1)^2} = 2}$$

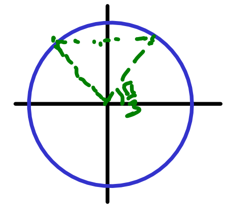


$$2\left(\underbrace{\frac{\sqrt{3}}{2}}_{=\cos(\frac{\pi}{6})} \sin(2x) - \underbrace{\frac{1}{2}}_{=\sin(\frac{\pi}{6})}\cos(2x)\right) = \sqrt{3}$$

$\sin(a-b) = \sin a \cdot \cos b - \cos a \sin b$

$$2\left(\cos\left(\frac{\pi}{6}\right)\sin(2x) - \sin\left(\frac{\pi}{6}\right)\cos(2x)\right) = \sqrt{3}$$

$$\sin\left(2x-\frac{\pi}{6}\right)=\frac{\sqrt{3}}{2}$$



$$\begin{cases} 2x-\frac{\pi}{6}=\frac{\pi}{3}+n2\pi \\ 2x-\frac{\pi}{6}=\frac{2\pi}{3}+n2\pi \end{cases}$$

$$\begin{cases} 2x=\frac{\pi}{3}+\frac{\pi}{6}+n2\pi \\ 2x=\frac{2\pi}{3}+\frac{\pi}{6}+n2\pi \end{cases}$$

$$\begin{cases} 2x=\frac{\cancel{3}^{1}\pi}{\cancel{6}_{2}}+n2\pi \\ 2x=\frac{5\pi}{6}+n2\pi \end{cases}$$

Svar: $$\begin{cases} x=\frac{\pi}{4}+n\pi \\ x=\frac{5\pi}{12}+n\pi \end{cases} \qquad n\in\mathbb{Z}$$

$\boxed{26}$

$$2^x\cdot 3^{x-2}=4 \qquad\qquad a^{b-c}=\frac{a^b}{a^c}$$

$$2^x\cdot\frac{3^x}{3^2}=4$$

$$2^x\cdot 3^x=2^2\cdot 3^2 \qquad\qquad a^c\cdot b^c=(a\cdot b)^c$$

$$(2\cdot 3)^x=(2\cdot 3)^2$$

$$6^x=6^2$$

Svar: $\boxed{x=2}$

3a

$$\frac{\frac{a}{b}}{\frac{c}{d}} = \frac{a \cdot d}{b \cdot c}$$

$$\frac{x - \frac{1}{y}}{y - \frac{1}{x}} = \frac{\frac{x \cdot y}{y} - \frac{1}{y}}{\frac{x \cdot y}{x} - \frac{1}{x}} = \frac{\frac{x \cdot y - 1}{y}}{\frac{x \cdot y - 1}{x}} = \frac{\cancel{(x \cdot y - 1)} \cdot x}{y\,\cancel{(x \cdot y - 1)}} = \frac{x}{y}$$

3b

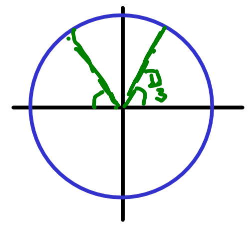
$$75 \cdot \frac{\pi}{180} =$$

$$\frac{75}{360} \cdot 2\pi = \frac{75 \cdot \pi}{180} = \frac{15\pi}{36} = \frac{5\pi}{12}$$

Svar!

3c

$$\sin 3x = \frac{\sqrt{3}}{2}$$



$$\begin{cases} 3x = \frac{\pi}{3} + n\,2\pi \\ 3x = \frac{2\pi}{3} + n\,2\pi \end{cases}$$

$$\begin{cases} x = \frac{\pi}{9} + n\,\frac{2\pi}{3} \\ x = \frac{2\pi}{9} + n\,\frac{2\pi}{3} \end{cases}$$

4a

$$f(x) = 4x^2 - 12x + 5 = 4\left(x^2 - 3x + \frac{5}{4}\right)$$

$$= 4\left(\underbrace{\left(x - \frac{3}{2}\right)^2}_{x^2 - 3x + \frac{9}{4}} - \frac{9}{4} + \frac{5}{4}\right) = 4\left(\left(x - \frac{3}{2}\right)^2 - \frac{\cancel{4}^{\,1}}{4}\right)$$

$$= \underbrace{4\left(x - \frac{3}{2}\right)^2}_{\geq 0} \underbrace{- 4}_{\text{Funktionens minsta värde}}$$

Svar: -4 (då $x = \frac{3}{2}$)

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

$$f(a+1) - f(1) = 5(a+1) - 3(a+1)^2 - (5\cdot 1 - 3\cdot 1^2)$$

$$= 5a + \cancel{5} - 3(a^2+2a+1) - \cancel{5} + 3$$

$$= 5a - 3a^2 - 6a - \cancel{3} + \cancel{3} = -3a^2 - a$$

$$= -a(3a+1)$$ ← Svar!

4c $f(x) = \dfrac{x+2}{x-2}, \quad x \neq 2$

$V_{f^{-1}} = D_f =]-\infty, 2[\cup]2, \infty[$

$D_{f^{-1}} = (V_f =]-\infty, 1[\cup]1, \infty[)$

Bestem $f^{-1}(x)$

$$y = f^{-1}(x)$$

$$f(y) = x$$

$$\frac{y+2}{y-2} = x$$

$$y + 2 = x(y-2)$$

$$y + 2 = x\cdot y - 2x$$

$$2x + 2 = x\cdot y - y$$

$$2(x+1) = (x-1)y$$

$$y = 2\,\frac{x+1}{x-1}$$

dvs

$$\boxed{f^{-1}(x) = 2\,\frac{x+1}{x-1}}$$

Svar!