

1. Given $g(x) = \frac{4-3x}{x-2}$ and $h(x) = \frac{6x}{3-x}$, find the domain of $(g \circ h)(x)$.

$$(g \circ h)(x) = \frac{4-3\left(\frac{6x}{3-x}\right)}{\frac{6x}{3-x}-2} = \frac{4(3-x)-3(6x)}{6x-6+2x} = \frac{(12-22x)}{(8x-6)} = \frac{6-11x}{4x-3}$$

$x \neq \frac{3}{4} \quad x \neq 3$

Domain: $(-\infty, \frac{3}{4}) \cup (\frac{3}{4}, 3) \cup (3, \infty)$

2. Solve for $25^x - 19(5^x) - 150 = 0$

$$(5^x)^2 - 19(5^x) - 150 = 0 \quad 5^x = 25$$

$$= [5^x - 25][5^x + 6] = 0 \quad \boxed{x=2} \quad \checkmark \quad \cancel{5^x = -6} \quad \text{No solution}$$

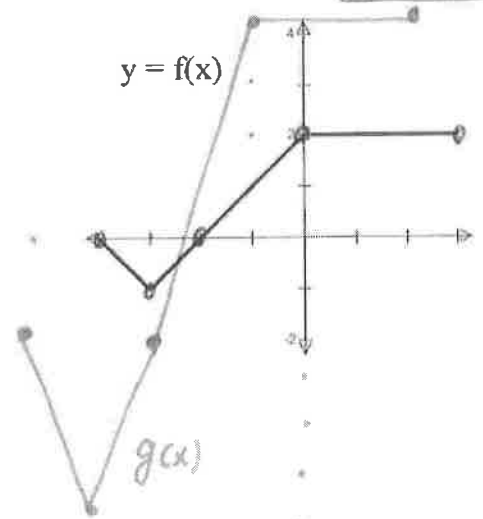
3. If $\ln x = t$ and, rewrite $\ln \sqrt{xy} + \ln\left(\frac{x}{e}\right)$ in terms of t and u .

$$\ln \sqrt{xy} + \ln\left(\frac{x}{e}\right) = \frac{1}{2} \ln xy + \ln x - \ln e = \frac{1}{2} [\ln x + \ln y] + \ln x - 1 = \frac{3}{2}t + \frac{1}{2}u - 1$$

4. Given the function $f(x)$, sketch the graph of $g(x) = 3f(x+1) - 2$

New x	x	y	New y
-5	-4	0	-2
-4	-3	-1	-5
-3	-2	0	-2
-1	0	2	4
2	3	2	4

$$\begin{matrix} (-5, -2) \\ (-4, -5) \\ (-3, -2) \\ (-1, 4) \\ (2, 4) \end{matrix} \Rightarrow g(x)$$



5. Find a given that when $x^3 - 4x^2 + ax + 50$ is divided by $x+3$, the remainder is 20.

$$f(x) = x^3 - 4x^2 + ax + 50$$

$$\Rightarrow f(-3) = (-3)^3 - 4(-3)^2 + a(-3) + 50 = 20$$

$$= -27 - 36 - 3a + 50 = 20 \Rightarrow -3a = 33 \quad \boxed{a = -11} \quad \checkmark$$

6. Find a if the coefficient of x^9 in the expansion of $(3x+a)^{12}$ is -5940 .

$${}^{12}C_r (3x)^{12-r} (a)^r = -5940 \cdot x^9$$

$$12-r = 9 \Rightarrow {}^{12}C_3 (3)^9 (a)^3 = -5940$$

$r=3$

Use calculator: $a = -\frac{1}{9}$