2) If these are functions:

a) $y = x^2 + 1$ $\qquad x = \sqrt{y-1}$

↳ this is ~~not~~ a f-n

b) $y^2 = x + 1.$

$x = y^2 - 1$ $\qquad$ → this is a function

Solution:

let $x = 3.$

$y = x^2 + 1$

$y = 3^2 + 1$

$y = 10.$ $\qquad$ X

b) $y^2 = 3 + 1$

$y^2 = 4$

$y = \sqrt{4}$ $\qquad y = 2.$

$y = -2$

3) Surjective f-ns. (at least 1 input for each output).

1) $\mathbb{Z} \to \mathbb{Z}$ $\qquad f(n) = 3n$

$y = 3n$

$n = \frac{y}{3}$?

2) yes, surjective

3). surjective

Solution:

not surjective. —

not surjective. —

surjective ✓

4) Injective (have 0 or 1 output for each input).

1) No

2) ~~yes~~ No (2 outputs for a).

3) Yes

1) yes —

2) No ✓

3) yes ✓

5) If $f(x) = \frac{1}{x+2}$ and $g(x) = \frac{1}{x} - 2$, is $g = f^{-1}$?

$\cancel{\frac{1}{x+2}} =$ $\qquad g(f(x)) = \frac{1}{\frac{1}{x+2} - 2} = x + 2 - 2 = x$

$g = f^{-1}$ & $f = g^{-1}$

$f(g(x)) = \frac{1}{\frac{1}{x} \cancel{-2} + \cancel{2}} = \frac{1}{\frac{1}{x}} = x.$

X

Solution :

find the inverse of the fn $f(x) = 2 + \sqrt{x-4}$

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

$f(x) = \sqrt{x}$.

$x^{-1} = \sqrt{x}$.

$y = 2 + \sqrt{x-4}$

$(y-2)^2 = x-4$

$x = (y-2)^2 + 4$

So for $f^{-1}(x) = (x-2)^2 + 4$

D $[4; \infty)$

R $[2; \infty)$.

f^{-1} $[2; \infty)$.

$C = \frac{5}{9}(F-32)$ $\times \frac{9}{5}$

~~$9c = 5(5F - 32)$~~

$C = \frac{5}{9}F - \frac{5 \times 32}{9}$

$C = \frac{5}{9}F - \frac{160}{9}$

$9c = 5F - 160$

$5F = 9c + 160$

$F = \frac{9c + 160}{5}$

Solution.

$C\frac{9}{5} = F - 32$

$F = \frac{9}{5}C + 32$.

-2-

$g(x) = 2\sqrt{x-4}$

Find the domain & range of the f.

D - all possible input values

R - all poss. output v.

Domain. $\Rightarrow (4; \infty)$

R. $(0; \infty)$ ✓

Find domain & range. → tells that parabola opens upwards.

$h(x) = +2x^2 + 4x - 9$.

$D \Rightarrow \mathbb{R} \rightarrow (-\infty : \infty)$

Range $\Rightarrow [0 : \infty)$

Find Domain $f(x) = x - 4/x^2 - 2x - 15$ is $(-\infty; -3) \cup (-3, 5) \cup (-5; \infty)$.

$f(x) = \dfrac{x-4}{x^2 - 2x - 15}$.

~~$x \neq 0$.~~ $x \in (-\infty; \infty)$.

Solution: set the denominator to 0 & so solve:

$x^2 - 2x - 15 = 0$

$(x-5)(x+3) = 0$.

$x - 5 = 0 \quad x = 5$

$x + 3 = 0 \quad x = -3$.

Two solutions 5, -3. These should be excluded, as if ~~denominator~~ $x =$ eq. 5 or -3, the denominator ~~will~~ equal 0.

$f(x) = \begin{cases} -2x + 1 & -1 \leq x < 0 \\ x^2 + 2 & 0 \leq x \leq 2 \end{cases}$.

x	$f(x)$
-1	3
0	1

$-2x = -1$

$x = \frac{1}{2}$. ?

$x^2 = -2$.

$x = \sqrt{-2}$

$f(x) = x^2 + 2$

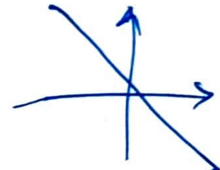
$0 \leq x \leq 2$

not sure ?

x	$f(x)$
0	2
1	3
2	6

Find slope

$(\overset{x_1}{-1}, \overset{y_1}{2})$ & $(\overset{x_2}{3}, \overset{y_2}{-4})$



negative slope

$$\text{slope} = \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-4-2}{3+1} = \frac{-6}{4} = -\frac{3}{2}.$$

$y = mx + b.$

passes through point $(\overset{x}{1}, \overset{y}{-1})$.

$m = \frac{3}{4}.$

$-1 = \frac{3}{4} \cdot 1 + b$

$-1 - \frac{3}{4} = b$

$b = -\frac{7}{4} = 1\frac{3}{4}.$

$-1 = \frac{3}{4} + b$

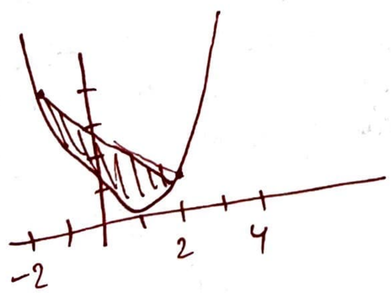
$b = -1 - \frac{3}{4}$

$b = \frac{-7}{4}$

$\cancel{-b = \frac{3}{4} + 1}$

?

Parabole - find the avg rate of change on the interval $[-1, 2]$



what's the f-n?
$y = x^2 + 1$. ?

Compute the avg rate of change of $f(x) = x^2 - \frac{1}{x}$ on the interval $[2, 4]$

$f(2) = 2^2 - \frac{1}{2}$ $f(4) = 4 - \frac{1}{2} = 72$. ?

$f(t) = t^2 - t$ $h(x) = 3x + 2$.

$f(h(1)) = f \circ h$

$f \circ h(x) = ?$

$f \circ g(x)$ where. $f(x) = \frac{5}{x-1}$ and $g(x) = \frac{4}{3x-2}$

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

$$f(x) = \frac{1}{5} \cdot \frac{3x-2}{4} = \frac{3x-2}{20}$$

---

1) $(g - f)(x)$ $\left(\frac{g}{f}\right)(x)$

a) $f(x) = x - 1$

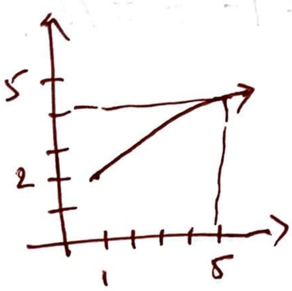
$g(x) = x^2 - 1$

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

$(x^2 - 1) - (x - 1)(x) = \cancel{x^2} - 1 - \cancel{x^2} - x = -1 - x$

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

Write a formula for the graph, which is a transformation of the square root f-n.



transposed right 1. unit
& up 2

?

1x 2y   5x 4y.

$f(x) = x^3 + 2x$ → is an odd f-n.

$f(s) = \cancel{5s}\ s^4 + 3s^2 + 7$ → even f-n

$(5, 1)$ $(8, 7)$.

$y - y_1 = m(x - x_1)$

$m = \frac{y - y_1}{x - x_1}$

$1 - 7 = m(5 - 8)$

$-6 = m(-3)$

$m = 2.$

$m = \frac{-6}{-3} = 2.$

$y - y_1 = m(x - x_1)$

$m = 2$

$y - 1 = 2(x - 5)$

$y - 1 = 2x - 10$

$y = 2x - 9.$

The slope intercept equation of the line is. $y = 2x - 9$

DM Homework Week 1.

$f(x)$ is a linear f-n.
$(3; -2)$ $(8; 1)$

Slope ?
Is f-n increasing or decreasing ?

$y = mx + b$.

$\text{slope} = \frac{\text{rise}}{\text{run}} = \frac{1+2}{8-3} = \frac{3}{5}$ increasing bcs $m > 0$

Find all local minima & maxima

$(-1, -2)$ $(1, 2)$.

$f(x) = 2x^2 - 6x + 7$
A B.

$h = -\frac{b}{2a} = -\frac{6}{4} = -\frac{3}{2}$.

$k = f(h) = f\left(-\frac{b}{2a}\right)$

$k = f\left(-\frac{3}{2}\right)$.