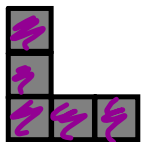


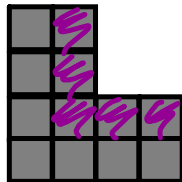
Combinations of Functions

Determine an equation relating the number of squares to the stage number for the following pattern.

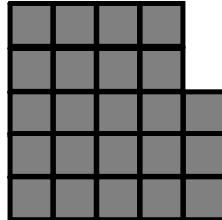
Stage 1



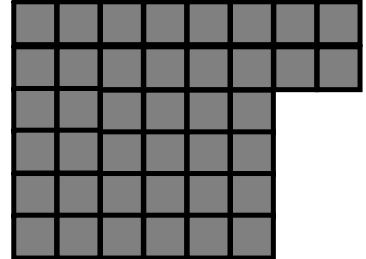
Stage 2



Stage 3

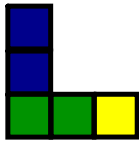


Stage 4

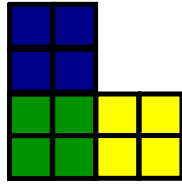


Could we break up each stage to better show a pattern.

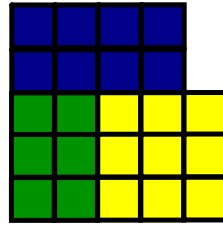
Stage 1



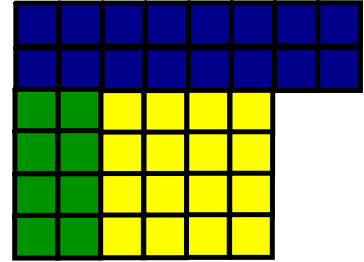
Stage 2



Stage 3



Stage 4



Stage Number	Blue Tiles	Green Tiles	Yellow Tiles	Total Tiles
1	2	2	1	5
2	4	4	4	12
3	8	6	9	23
4	16	8	16	40
5	32	10	25	67
n	2^n	$2n$	n^2	

Equation for Blue tiles: $f(x) = 2^n$

Equation for Green tiles: $g(x) = 2n$

Equation for Yellow tiles: $h(x) = n^2$

Equation for the pattern:

$$r(x) = f(x) + g(x) + h(x)$$

$$= 2^x + 2x + x^2$$

Superposition Principle:

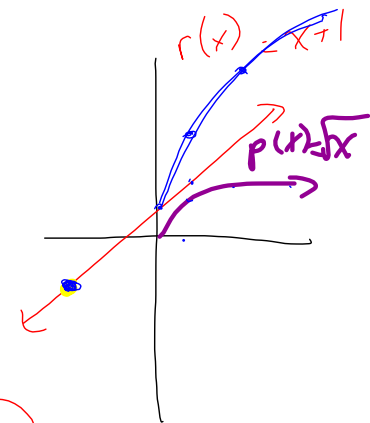
the sum of two or more functions can be found by adding the ordinates of the functions at each abscissa

(y-values)

(x-values)

This is also true when determining the difference of functions.

The domain of a combined function is the Domain that the original functions share.



Domain

$$r(x) \rightarrow x \in \mathbb{R}$$

$$p(x) \Rightarrow \{x \in \mathbb{R} \mid x \geq 0\}$$

$$\text{let } f(x) = r(x) + p(x)$$

Domain of $f(x)$

$$D \Rightarrow \{x \in \mathbb{R} \mid x \geq 0\}$$

Student council has decided to sell t-shirts to raise money for a semi-formal. There is a fixed cost of \$200 to set up the printing, plus \$5 per shirt to make them. Council has decided to sell the t-shirts for \$10 each.

a) Write an equation to represent the total cost to produce the t-shirts

$$C = 200 + 5t$$

b) Write an equation to represent the revenue from the t-shirts

$$R = 10t$$

c) Graph both of these functions on the same axis

d) Determine a profit function.

$$P = R - C$$

$$P(t) = 10t - (200 + 5t)$$

$$P = 5t - 200$$

e) Under what circumstances does council lose money? make money?

< 40 shirts will lose money

> 40 shirts will make money.

f) Determine the domain and range for all 3 functions in the context of this problem.

$$\underline{\text{Cost}} \quad D \rightarrow \{x \in I \mid x \geq 0\}$$

$$R \rightarrow \{y \in 5I \mid y \geq 200\}$$

$$\underline{\text{Revenue}} \quad D \rightarrow \{x \in I \mid x \geq 0\}$$

$$R \rightarrow \{y \in 10I \mid y \geq 0\}$$

$$\underline{\text{Profit}} \quad D \rightarrow \{x \in I \mid x \geq 0\}$$

$$R \rightarrow \{y \in I \mid y \geq -200\}$$

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