

From Wednesday's Quiz

Bonus, because I don't think I demo'ed it.

#97, § 3.6 $RHS \neq 0$

$$\frac{q-2}{q+3} < 2 \cdot \frac{q+3}{q+3} = \frac{2q+6}{q+3}$$

Can't throw away the denominator, unless it's an equation. We're facing an inequality. Need sign pattern.

$$\frac{q-2}{q+3} < \frac{2q+6}{q+3} \Rightarrow$$

$$\frac{q-2}{q+3} - \frac{2q+6}{q+3} < 0$$

$$\frac{q-2-(2q+6)}{q+3} < 0$$

$$\frac{q-2-2q-6}{q+3} < 0$$

$$\frac{(-q-8)}{q+3} < 0$$



$-q-8$ sucks, so -1 times both sides:

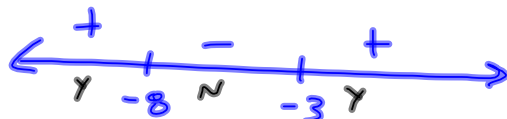
$$\frac{(q+8)}{q+3} > 0$$

critical:

$$q = -8, q = -3$$

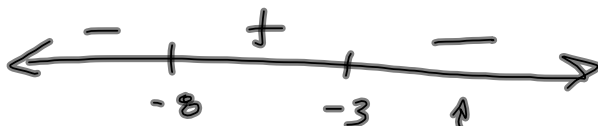
critical values ?

$$\begin{aligned} -q-8 &= 0 & q+3 &= 0 \\ -q &= 8 & q &= -3 \\ q &= -8 & & \end{aligned}$$



Test $q=0$
(or anything > -3)

Want > 0
Want +
 $(-\infty, -8) \cup (-3, \infty)$



Test: $q=0$
 $\frac{-0-8}{0+3} = -\frac{8}{3}$ " - "

Want < 0 , i.e., " - " is good

$$(-\infty, -8) \cup (-3, \infty)$$

§8.1/8.2/8.3
 \sum - Sigma stands for Sum

$\sum_{k=1}^4 a_k$ = the sum, from $\underbrace{k=1 \text{ to } k=4}_{k=1 \text{ to } 4}$, of
 the a_k 's.

$$= a_1 + a_2 + a_3 + a_4$$

a_k is ~~the~~ a function from the natural numbers to the real numbers.

$a_k = f(k)$ and k is a natural number

$$\mathbb{N} = \{1, 2, 3, \dots\} \quad k \in \mathbb{N}$$

$$a_k = 3k - 1$$

$$\sum_{k=1}^5 a_k = \sum_{k=1}^5 (3k-1) = (3(1)-1) + (3(2)-1) \\ + (3(3)-1) + (3(4)-1) \\ + (3(5)-1)$$

$$= 2 + 5 + 8 + 11 + 14$$

Recursive Definition:

$$a_1 = 2, \quad a_{k+1} = a_k + 3 \quad \text{Fractal, Dude.}$$

$$a_k = a_{k-1} + 3$$

Representation is NOT unique.

$$\sum_{k=1}^5 (3k-1) = \sum_{k=0}^4 (3(k+1)-1)$$

$$a_0 = 3(1) - 1 = 3(0+1) - 1 = \boxed{3(k+1) - 1}$$

work the zero into the formula.
 Index is zero

$$0! = 1$$

$$1! = 1$$

$$2! = 2 \cdot 1 = 2$$

$$3! = 3 \cdot 2 \cdot 1 = 6$$

$$4! = 4 \cdot 3 \cdot 2 \cdot 1 = 24$$

$$5! = \quad \quad \quad = 120$$

etc.

$$n! = n(n-1)(n-2)\cdots(3)(2)(1)$$

Factorials



$$\begin{aligned} \sum_{k=1}^3 5 \cdot 2^k &= 5(2^1) + 5(2^2) + 5(2^3) \\ &= 5(2 + 2^2 + 2^3) \\ &= 5 \sum_{k=1}^3 2^k \end{aligned}$$

Any thing without a "k" in it can be factored out.

$$\sum_{k=1}^{100} k = 1 + 2 + 3 + 4 + \dots + 97 + 98 + 99 + 100$$

$$= 50(100)$$

In general $\sum_{k=1}^n k = \frac{n(n+1)}{2}$

$$\sum_{k=1}^{37} 5k = 5 \sum_{k=1}^{37} k = 5 \left(\frac{37(38)}{2} \right) = 5(37)(19)$$

$$3610$$

$$\begin{array}{r} 5 \quad 165 \\ \quad 19 \\ \hline 11485 \\ \quad 1650 \\ \hline 3135 \end{array}$$

$$S'_{8.1} \# 5 \quad 8, 18, 20, 24, 28, 32, \\ 38, 42, 44, 50^*, 54^*, 60$$

* Only do 1st 4 terms.

$$S'_{8.2} \# 5 \quad 6, 8, 18^*, 20, 22, 26, 29, 32, 38$$

$$* \sum_{i=1}^6 (i-1)(i-3) \quad \text{I say}$$

$$\text{" Expand : } (i-1)(i-3) = i^2 - 4i + 3$$

& use this :

$$\sum_{k=1}^n 1 = n \Rightarrow \sum_{k=1}^n 5 = 5 \sum_{k=1}^n 1 = 5n$$

$$\sum_{k=1}^n k = \frac{n(n+1)}{2} \Rightarrow \sum_{k=1}^n 7k = 7 \left(\frac{n(n+1)}{2} \right)$$

$$\sum_{k=1}^n k^2 = \frac{n(n+1)(2n+1)}{6}$$

$$S_0 \sum_{k=1}^{50} (k+2)(k-5) = \sum_{k=1}^{50} (k^2 - 3k - 10)$$

$$= \sum_{k=1}^{50} k^2 - 3 \sum_{k=1}^{50} k - 10 \sum_{k=1}^{50} 1$$

$$= \frac{50(51)(2(50)+1)}{6} - 3 \frac{50(51)}{2} - 10 \cdot 50$$

