Tarefa básica

FATORIAL DE UM Nº NATURAL

1) a) $4!$

$4.3.2.1 = 24$

b) $5! - 6!$

$5! = 5.4! = 5.24 = 120 \rightarrow 5! - 6!$

$5! - 6.5! \rightarrow 5!(1-6)$

$5!(-5) \rightarrow \underbrace{120 . -5}_{-600}$

c) $\frac{9!}{6!} \rightarrow \frac{9.8.7.\cancel{6!}}{\cancel{6!}} \rightarrow 504$

d) $\frac{98!}{100!} \rightarrow \frac{\cancel{98!}}{100.99.\cancel{98!}} \rightarrow \frac{1}{9.900}$

2) $\frac{\frac{1}{n!} - \frac{n}{(n+1)!}}{}$

$\frac{\frac{(n+1)! - n}{n!}}{(n+1)!} \rightarrow \frac{\frac{(n+1)\cancel{n!} - n}{\cancel{n!}}}{(n+1)!}$

$\frac{\cancel{n} + 1 - \cancel{n}}{(n+1)!} \rightarrow \frac{1}{(n+1)!}$ Alternativa A)

3) $\frac{(n!)^2 - (n-1)!\,n!}{(n-1)!\,n!}$

$\frac{\cancel{n!}(n! - (n-1)!)}{(n-1)!\,\cancel{n!}}$

$\frac{n! - (n-1)!}{(n-1)!} \rightarrow \frac{n.(n-1)! - (n-1)!}{(n-1)!}$

$\frac{\cancel{(n-1)!}(n-1)}{\cancel{(n-1)!}} \rightarrow n-1$

Alternativa A)

4) $\dfrac{(n+2)!\,(n-2)!}{(n+1)!\,(n-1)!} = 4$

$\dfrac{[(n+2)\cancel{(n+1)}\cancel{n}\cancel{(n-1)}\cancel{(n-2)!}]\,\cancel{(n-2)!}}{[\cancel{(n+1)}\cancel{n}\cancel{(n-1)}\cancel{(n-2)!}][(n-1)\cancel{(n-2)!}]} = 4$

$\dfrac{n+2}{n-1} = 4$

$n+2 = 4(n-1)$

$n+2 = 4n-4$

$n-4n = -4-2$

$-3n = -6$

$\to n = \dfrac{-6}{-3}$

$\boxed{n=2}$

par → Alternativa A)

5) $\dfrac{(n+1)!-n!}{(n+1)!} = \dfrac{7}{n+1}$

$\dfrac{(n+1)n!-n!}{(n+1)n!} = \dfrac{7}{n+1}$

$\dfrac{\cancel{n!}(n+1-1)}{(n+1)\cancel{n!}} = \dfrac{7}{n+1}$

$\to \dfrac{n+1-1}{n+1} = \dfrac{7}{n+1}$

$\dfrac{n}{\cancel{n+1}} = \dfrac{7}{\cancel{n+1}}$

$n = 7$

Alternativa D)

6) n = número natural, ≥ 1

$(n-1)!\,[(n+1)!-n!]$

$(n-1)!\,[(n+1)n!-n!]$

$(n-1)!\,[n!(n+1-1)]$

$(n-1)!\,(n!\,.\,n)$

$\underbrace{n.(n-1)!}_{n!}.\,n!$

$n!\,.\,n!$

$(n!)^2 \to$ alternativa D)

7) $\dfrac{n! + (n-1)!}{(n+1)! - n!} = \dfrac{6}{25}$

$\dfrac{n(n-1)! + (n-1)!}{(n+1)n! - n!} = \dfrac{6}{25}$

$\dfrac{(n-1)!(n+1)}{n!(n+1-1)} = \dfrac{6}{25}$

$\dfrac{(n-1)!(n+1)}{n! \cdot n} = \dfrac{6}{25}$

$\rightarrow \dfrac{\cancel{(n-1)!}(n+1)}{n\cancel{(n-1)!} \cdot n} = \dfrac{6}{25}$

$\dfrac{\text{I} \quad n+1}{\text{II} \quad n^2} = \dfrac{6}{25}$

I $n+1 = 6 \rightarrow n = 6-1 = 5$

II $n^2 = 25 \rightarrow n = \sqrt{25} = 5$

Alternativa C)

8) $21! - 221 \rightarrow$ Qual é a dezena?

1. Primeiro, descobre-se a quantidade de zeros no fim do número 21!.

2. Para isso, precisamos achar números terminados em 5 e múltiplos de 10.

$21 \rightarrow$ 5 e 15, até chegar no 21.

2 nºs terminados em 5 $\rightarrow \boxed{\text{2 zeros}}$

$21 \rightarrow$ 10 e 20, até chegar no 21

2 nºs múltiplos de 10 $\rightarrow \boxed{\text{2 zeros}}$

3. No total, o número de 21! termina em 4 zeros.

$$\begin{array}{r} \overset{9\,9}{0\cancel{0}\cancel{0}0} \\ -\ 221 \\ \hline 0779 \end{array} \rightarrow \begin{array}{ccc} 7 & 7 & 9 \\ C & D & U \end{array}$$

$\downarrow$

dezena = 7

Alternativa D)