→ Lista Matematica Discreta

EXERCICIOS PARES

SEÇÃO I. introdução

(2) $5 \cdot 6 = \underline{30}$ formas (blusa + saia)

(4) $80 \cdot 90 = 7.200$ (casais diferentes)

(6) $12 \cdot 11 = 132$ maneiras (prêmio)

(8) $7 \cdot 2 \cdot 3 = 42$ alternativas de carros

(10) $\underline{2^{20}}$ formas ela poderia responder

(12) $\underline{2^{32}}$ palavras distintas

(14) → escolhe
→ ñ escolhe } 2 $\quad 2^6 = 64 - 1$ → caso escolha nenhum!

$= \underline{63}$

(16) 26.26.26.26.26.26 = 308.915 716, sim!

(18) $5 . 5 . 5 = \underline{125}$

(20) Calça — C
Paletó — P

$C \cdot P = 24$

1C + 24P
2C + 12P
3C + 8P
4C + 6P
6C + 4P
8C + 3P

mínimo $= \underline{10}$

$0 - 9 = \boxed{10}$

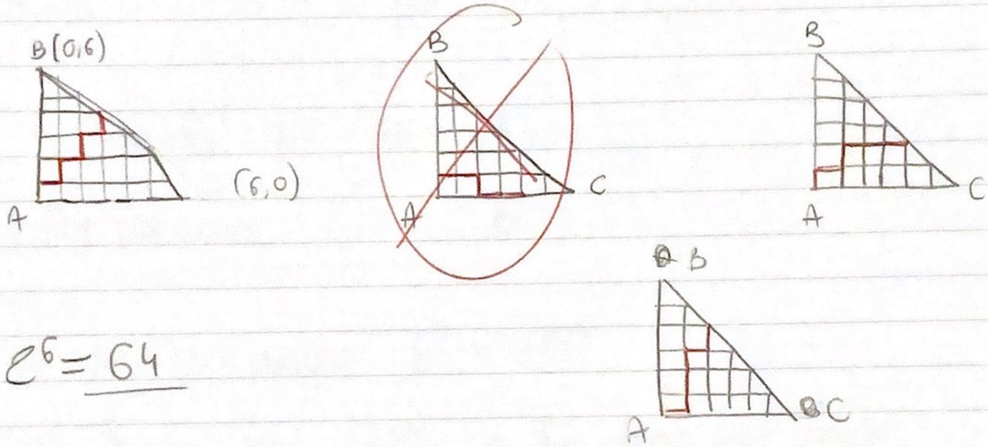
(22) $2 \quad \underset{0^{\times}}{\underline{9}} \cdot \underset{0^{\times}}{\underline{9}} \cdot \underline{10} \cdot \underline{10} \cdot \underline{10} \cdot \underline{10} \cdot \underline{10}$

8.100.000 números diferentes podemos ter.

(24) resolvido no livro

(26) resolvido no livro

(28)



$2^6 = \underline{64}$

(30) $N = 2^a \cdot 3^b \cdot 5^c \cdot 7^d$ DÚVIDA

$n = (a+1) * (b+1) * (c+1) * (d+1)$

(32) n $\quad n-1$ a serem combinados

$$\frac{n*(n-1)}{2} + n = \boxed{\frac{n*(n+1)}{2}}$$

(34) (B) $\underline{52} \cdot \underline{51} \cdot \underline{50} \cdot \underline{49} \cdot \underline{48} = 311.875.200$

(A) $52^5 = 380204032$

SEÇÃO 2

$$A_{m,r} = \frac{m!}{(m-r)!}$$

(42) Calcular:

(A) $A_{6,3} = 6.5.4 = \underline{120}$

(B) $A_{10,4} = 10.9.8.7 = \underline{5040}$

(C) $A_{20,1} = \underline{20}$

(D) $A_{12,2} = 12.11 = \underline{132}$

(44) 4 posicões p/ cada 1

24 posicoes 6

nº de possibilidades $6! = 720$

nº de formas $= \frac{720}{24} = 30$ possibilidades

(46) Resolvido no livro

(48) $A_{16,2} = 16 \cdot 15 = \boxed{240}$

(50) $A_{5\,3} = 5.4 = \underline{20}$

(52) $22 - 3 = 19$

$A_{19,10} \cdot A_{3\,1}$

$A_{19,10} = \frac{19!}{9!} = \frac{19.18.17.16.15.14.13.12.11.10.\cancel{9!}}{\cancel{9!}}$

~~$A_{19,10}$~~ $=$ $R = \boxed{\frac{3 \cdot 19!}{9!}}$

(54) Resolvido no livro

(56) $A_{5,3} \cdot A_{3,2}$

$$\frac{5!}{2!} \cdot \frac{3!}{1!} = \frac{5.4.\cancel{2!}}{\cancel{2!}} \cdot \frac{3.2.\cancel{1}}{\cancel{1}} = 20 \cdot 6 = \boxed{120}$$

(58) resolvida no livro

(60) m^n n-uplas possíveis

(62) $A_{9,3} = 9.8.7 = \underline{504}$

(64) $\_\ \_\ \underline{6} \cdot \_\ \_\ \underline{8}$

$A_{5,2} + A_{5,2}$

$5 \cdot 4 = 20 + 5.4 = 20$

$20 + 20 = \underline{40}$

20

(66) $500 \leq x \leq 1000$

$\_\ \_\ \_\ \_$

5
6
7
8
9

$5 \cdot 8 \cdot 7 = \underline{280}$

1 - $\boxed{9}$

(68) $9 \cdot 9 \cdot 9 \cdot 9 = 6561$

$-$

$9 \cdot 8 \cdot 7 \cdot 6 = 3024$

$\Big\} \ 3537$

(70)

$\underline{1}\ \underline{4}\ \_\ \_ \qquad \underline{1}\ \_\ \underline{4}\ \_$

$\_\ \underline{1}\ \underline{4}\ \_ \qquad \_\ \underline{1}\ \_\ \underline{4}$

$\_\ \_\ \underline{1}\ \underline{4} \qquad \underline{1}\ \_\ \_\ \underline{4}$

$\Big\}$ 6 formas

$$C_{4,2} = \frac{4!}{2!2!} \longrightarrow \frac{4.3.\cancel{2!}}{2!\cancel{2!}} = \frac{4.3}{2} = \frac{12}{2} = 6$$

Espaços vagos: $A_{4,2} = 4 \cdot 3 = 12$

$6 \cdot 12 = 72$ arranjos

(72) $5 \cdot 4 \cdot 3 \cdot 3 \longrightarrow 180$

1
3
5

(74) $5 \cdot 4 \cdot 3 \cdot 1 = 60$

Tirar dúvida do 105-113

SEÇÃO III

124 a $\binom{6}{2} = \frac{6!}{2!4!} = \frac{\overset{3}{\cancel{6}}.5.\cancel{4!}}{\cancel{2}.\cancel{4!}} = \boxed{15}$

b $\binom{6}{4} = \frac{6!}{4!2!} = \frac{\overset{3}{\cancel{6}}.5.\cancel{4!}}{\cancel{4!}.\cancel{2}} \boxed{15}$

c $\binom{8}{0} = \frac{\cancel{8!}}{0!.\cancel{8!}} \quad \frac{1}{1} = \boxed{1}$

126 $\binom{n}{4} = \frac{n!}{4!.(n-4)!}$

128 $\frac{C_{8,p+2}}{C_{8,p+1}} = 2 \iff C_{8,p+2} = 2 . C_{8,p+1}$

$C_{8,p+2} = \frac{8!}{(p+2)!.(8-p+2)!} = \frac{8!}{(p+2)! * (6-p)!}$

$C_{8,p+1} = \frac{8!}{(p+1)!.(8-p+1)!} = \frac{8!}{(p+1)! * (7-p)!}$

$\frac{(p+1)!.(7-p)!}{((p+2)!(6-p)!)} = 2 \Rightarrow \frac{(p+1)!}{(p+2)!} \cdot \frac{(7-p)!}{(6-p)!} = 2$

$\frac{(7-p)}{(p+2)} = 2 \Leftarrow \frac{1}{(p+2)} \cdot (7-p) = 2$

$7-p = 2p+4$
$2p+p = 7-4$
$3p = 3$

$\underline{p=1}$

(139)

$C_{m,3} = 84$ $\qquad 84 = \dfrac{m!}{3!\,.\,(m-3)!}$

$$84 = \frac{m.(m-1)\cdot(m-2).\cancel{(m-3)!}}{6.\ \cancel{(m-3)!}}$$

$$6.84 = m.(m-1).(m-2)$$

$$504 = (m^2-m).(m-2)$$

$$= m^3-2m^2-m^2+2m$$

$$504 = m^3-3m^2+2m$$

$$m^3-3m^2+2m-504=0$$

?

(142) $C_{n,2} = 45$

$$45 = \frac{n!}{2!\,(n-2)!}$$

$$45 = \frac{n.(n-1)\cancel{(n-2)!}}{2.\cancel{(n-2)!}}$$

$90 = n(n-1)$

$90 = n^2-n$

$n^2-n-90=0$

(por bhaskara)

$n_1 = 10$

$n_2 = -9$

Como $n>0$, $\underline{n=10}$

(144) $C^{10}_{4} + C^{10}_{5} + C^{10}_{6} + C^{10}_{7} + C^{10}_{8} + C^{10}_{9} + C^{10}_{10}$

$\dfrac{10!}{4!\,6!} + \dfrac{10!}{\quad}$ . . . .

$\underline{848}$

SEÇÃO 4

198

$+ \rightarrow 8$
$- \rightarrow 4$ } 12

$$P_{12}^{8,4} \rightarrow \frac{12!}{8!\,4!} = \frac{12.11.10.9.\cancel{8!}}{4!\,\cancel{8!}}$$

$$= \frac{\overset{3}{\cancel{12}}.11.\overset{5}{\cancel{10}}.\overset{3}{\cancel{9}}}{\cancel{4}.\cancel{3}.\cancel{2}} \rightarrow 3.11.5.3 = \boxed{495}$$

$\boxed{200}$ $$P_6^{2,4} = \frac{6!}{2!\,4!} = \frac{\overset{3}{\cancel{6}}.5.\cancel{4!}}{\cancel{2}!\,\cancel{4!}} = 15$$

202

E → 1
SS → 2
TTT → 3
II → 2
C → 1
AA → 2

$$P_{11}^{3,2,2,2} \rightarrow \frac{11!}{3!\,2!\,2!\,2!}$$

$$\frac{11.\overset{5}{\cancel{10}}.9.\cancel{8}.7.6.5.\cancel{4}.\cancel{3!}}{\cancel{2}.\cancel{2}.\cancel{2}\;\cancel{3!}}$$

= 831.600 minutos

204

7

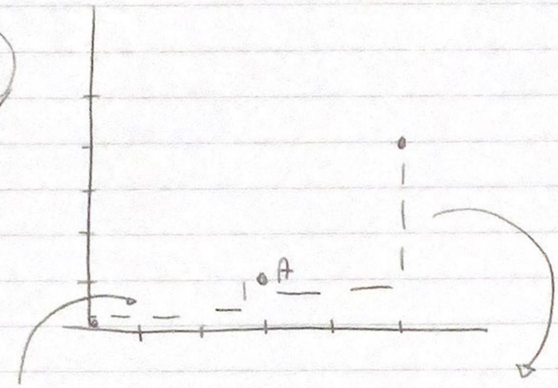
3 - 1
4 - 1
5 - 1
9 - 4

$$P_7^4 \quad \frac{7!}{4!} = \frac{7.6.5.\cancel{4!}}{\cancel{4!}}$$

= $\boxed{210}$ números

206 resolvido no livro!

208



$P_4^{3,1}$ $*$ $P_5^{2,3}$

$\frac{4!}{3!} = \frac{4.\cancel{3!}}{\cancel{3!}}$ $\qquad$ $\frac{5!}{2!3!} = \frac{5.\cancel{4}^{2}.\cancel{3!}}{\cancel{2}\ \cancel{3!}} = 10$

$4 . 10 = \boxed{40}$

210 $\boxed{= P_{A+B}^{A,B} = \frac{(A+B)!}{A!.B!}}$

A= Meninos
B= Meninas