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MATH 331
HW #'s 18 + 19
02/15/2012

(18) (A) HOW MANY 8 LETTER WORDS CAN BE MADE BY PERMUTING THE LETTERS: XXYYYZZW?

$$\frac{8!}{2!3!2!} = 8\cdot 7\cdot 6\cdot 5 = \boxed{1680}$$

18 A
19 A

(B) ASSUMING EACH OF THESE WORDS IS EQUALLY LIKELY TO BE CHOSEN, WHAT IS THE PROBABILITY THAT A RANDOM WORD BEGINS AND ENDS WITH THE SAME LETTER?

BEGINS w/ X: ENDS $\underline{X}\ \underline{YYYZZW}\ \underline{X} = \frac{6!}{3!2!} = 6\cdot 5\cdot 2 = 60$

BEGINS w/ Y: ENDS $\underline{Y}\ \underline{XXYZZW}\ \underline{Y} = \frac{6!}{2!2!} = 6\cdot 5\cdot 3\cdot 2 = 180$

BEGINS w/ Z: ENDS $\underline{Z}\ \underline{XXYYYW}\ \underline{Z} = \frac{6!}{2!3!} = 60$

$$Pr(X\_X \cup Y\_Y \cup Z\_Z) = \frac{60+180+60}{1680} = \frac{300}{1680} = \boxed{\frac{5}{28}}$$

(C) WHAT IS THE PROBABILITY THAT [ALL] THE LETTER Y's OCCUR CONSECUTIVELY?

let $YYY = \alpha \Rightarrow XX\alpha ZZW$, α is distinct

$$Pr(Y\_Y\_Y\_ \text{ appears}) = \frac{\frac{6!}{2!2!}}{1680} = \frac{180}{1680} = \boxed{\frac{3}{28}}$$

(19) WHAT IS THE COEFFICIENT OF $a^2b c^3 d^4$ IN THE COMPLETE EXPANSION OF $(a+b+c+d)^{10}$?

$$\frac{n!}{n_1!\,n_2!\,n_3!\,n_4!}, \quad n=10 \Rightarrow \frac{10!}{2!3!4!} = 10\cdot 9\cdot 4\cdot 7\cdot 5$$

$n_1 = 2$

$n_2 = 1$

$n_3 = 3$

$n_4 = 4$

$= \boxed{12600}$

Thanks for writing Larger.