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Ling 473

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Assignment II

Question 1

a)

a. P(E): $\frac{3}{8} = 0.375$

b. P(E): $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4} = 0.25$

c. P(G): $\left(\frac{1}{8} \times \frac{1}{4}\right) \times 2 = \frac{1}{16} = 0.0625$

d. P (H): $\frac{1}{2} = 0.5$

e. P(E ∪ H) : $\frac{3}{8} + \frac{4}{8} = \frac{7}{8} = 0.875$

f. P(F ∩ H): $\frac{1}{4} \times \frac{1}{2} = \frac{1}{8} = 0.125$

g. P (E ∩ F ∩ G): $\frac{3}{8} \times \frac{1}{4} \times \frac{1}{16} = \frac{3}{512} = 0.005859375$

h. P(H ∪ G): $\frac{1}{2} + \frac{1}{16} - \frac{1}{2} \times \frac{1}{16} = \frac{17}{32} = 0.53125$

i. P(H ∩ F^c): $\frac{3}{4} \times \frac{1}{2} = \frac{3}{8} = 0.375$

b)

	E	F	G
H	X		I
G		X	
F			

Question II

a) $\frac{22^8}{32^8} = 0.0499 = 4.99\%$

b)

a. Understand all 8 glyphs: $22^8 = 54{,}875{,}873{,}536$

b. Understand 7 out of 8: $22^7 \cdot (32-22)^{8-7} \cdot \binom{8}{8-7} = 199{,}548{,}631{,}040$

c. Understand 6 out of 8: $22^6 \cdot (32-22)^{8-6} \cdot \binom{8}{8-6} = 317{,}463{,}731{,}200$

d. Understand 5 out of 8: $22^5 \cdot (32-22)^{8-5} \cdot \binom{8}{8-5} = 288{,}603{,}392{,}000$

e. Understand 4 out of 8: $22^4 \cdot (32-22)^{8-4} \cdot \binom{8}{8-4} = 163{,}979{,}200{,}000$

f. Probability of understanding at least half of the 8 glyphs:

$$(a+b+c+d+e)/_{32^8} = 0.93175079 = 93.175\%$$

Extra Credit

a) Understand all 8 glyphs: $\frac{22!}{(22-8)!} = 12{,}893{,}126{,}400$

b) Understand 7 out of 8: $\frac{22!}{(22-7)!} \cdot \frac{(32-22)!}{((32-22)-(8-7))!} \cdot \binom{8}{8-7} = 68{,}763{,}340{,}800$

c) Understand 6 out of 8: $\frac{22!}{(22-6)!} \cdot \frac{(32-22)!}{((32-22)-(8-6))!} \cdot \binom{8}{8-6} = 135{,}377{,}827{,}200$

d) Understand 5 out of 8: $\frac{22!}{(22-5)!} \cdot \frac{(32-22)!}{((32-22)-(8-5))!} \cdot \binom{8}{8-5} = 127{,}414{,}425{,}600$

e) Understand 4 out of 8: $\frac{22!}{(22-4)!} \cdot \frac{(32-22)!}{((32-22)-(8-4))!} \cdot \binom{8}{8-4} = 61{,}937{,}568{,}000$

f) Probability of understanding at least half of the 8 glyphs:

$$(a+b+c+d+e) \Big/ \frac{32!}{(32-8)!} = 0.958237073 = 95.824\%$$