1) a) $S = \{GGG, GGR, GRG, RGG, GRR, RGR, RRG, RRR\}$

b) $A = \{GGG, GGR, GRG, RGG\}$ TOTAL OF 16 $\left\langle \begin{matrix} 9\ G \\ 7\ R \end{matrix} \right.$

$GGG \to (9/16)(8/15)(7/14)$ $GRG = (9/16)(7/15)(8/14)$

$GGR \to (9/16)(8/15)(7/14)$ $RGG = (7/16)(9/15)(8/14)$

ALL ARE M.E. $\Rightarrow P(A) = 4\left(\frac{9}{16}\right)\left(\frac{8}{15}\right)\left(\frac{7}{14}\right) = \frac{2016}{3360} = 0.6$

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2) a) $\binom{100}{50}$ $\equiv$ TOTAL WAYS TO SELECT 50 SENATORS FROM 100

VA NOT REPRESENTED $\to \binom{98}{50}$

$$PROB(\text{VA NOT REP}) = \binom{98}{50} \Big/ \binom{100}{50} = \frac{98!}{50!\,48!} \Big/ \frac{100!}{50!\,50!} = \frac{98!}{\cancel{50!}\,48!} \cdot \frac{\cancel{50!}\,50!}{100!}$$

$$= \frac{50 \cdot 49}{100 \cdot 99} = 0.247$$

b) EVERY STATE REP $\to 2 \cdot 2 \cdot 2 \cdots 2 = 2^{50}$

$$PROB(\text{EVERY STATE REP}) = 2^{50} \Big/ \binom{100}{50} = 1.116 \times 10^{-14}$$

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3) a) $P(A) = 15/40 = 0.375$

b) $P(B|A) = 25/39 = 0.641$

c) $P(A \cap B) = P(B|A)P(A) = \frac{25}{39} \cdot \frac{15}{40} = 0.2404$

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4) GET 2 $\diamond$ IN FIRST 4 DRAWS, THEN $\diamond$ ON 5TH DRAW

$\underbrace{\_\ \_\ \_\ \_}_{2\text{ OF }4\ \diamond}\ \underline{\diamond}$ $\binom{4}{2}$ WAYS.

NOW DD ND ND HAS PROB $\frac{13}{52} \cdot \frac{12}{51} \cdot \frac{39}{50} \cdot \frac{38}{49}$

DND D ND " " $\frac{13}{52} \cdot \frac{39}{51} \cdot \frac{12}{50} \cdot \frac{38}{49}$ SAME

$$SO\ PROB = \binom{4}{2}\left(\frac{13}{52}\right)\left(\frac{12}{51}\right)\left(\frac{39}{50}\right)\left(\frac{38}{49}\right) \cdot \left(\frac{11}{48}\right) = \frac{6 \cdot 2543112}{311875200} = .0489$$

5) a) $P(A \cap B) = P(A) + P(B) - P(A \cup B) = .2 + .3 - .4 = .1$

b) $P(A' \cup B') = P((A \cap B)') = 1 - P(A \cap B) = 1 - .1 = .9$

c) $P(A' \mid B) = \dfrac{P(A' \cap B)}{P(B)} = \dfrac{.2}{.3} = 2/3$

NOW $P(B) = P(B \cap A) + P(B \cap A')$

$.3 = .1 + P(B \cap A')$

$\Rightarrow P(B \cap A') = .2$

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6) $P(H) = .52$ TOSSES ARE INDEPENDENT.

$P(T) = .48$

OUTCOMES

HHH	TTH
HHT	THT
HTH	HTT
THH	TTT

CIRCLED ARE EXACTLY TWO IN A ROW

$P(HHT) = P(THH) = (.52)^2(.48)$

$P(TTH) = P(HTT) = (.48)^2(.52)$

SO PROB(2H OR 2T IN ROW) $= P(2H) + P(2T)$ SINCE M.E.

$= 2(.52)^2(.48) + 2(.48)^2(.52)$

$= 2(.52)(.48)(.52 + .48) = .4992$