1

(a) $\underline{10} \cdot \underline{10} \cdot \underline{10} \cdot \underline{26} \cdot \underline{26} \cdot \underline{3}$

possible licenses = $\boxed{2,028,000}$

(b)

<u>listing them</u>

abdec
abedc
adebc
adbec
aedbc
aebdc

6

<u>abstractly counting</u>

$\underline{a}\ \underline{3} \cdot \underline{2} \cdot \underline{1}\ \underline{c}$

$3 \cdot 2 \cdot 1 = 6$

answer = $\boxed{\text{6 permutations}}$

(2)

(a) $S = \{(H,H,H), (H,H,T), (H,T,H), (H,T,T),$
$(T,H,H), (T,H,T), (T,T,H), (T,T,T)\}$

(b) $E = \{(H,T,T), (T,H,T), (T,T,H), (T,T,T)\}$

$F = \{(T,T,H), (T,H,T), (H,T,T)\}$

$E \cap F = F$

$E \cup F = E$

$\bar{F} = \{(H,H,H), (H,H,T), (H,T,H), (T,H,H),$
$(T,T,T)\}$

(c) $P(E) = \frac{4}{8} = \frac{1}{2}$

$P(F) = \frac{3}{8}$

③

(a) See HW 2 - problem #10

(b) See HW 2 - Extra problems
problem #2

4

(a) $\binom{52}{3} = \frac{52!}{3!\,49!} = \frac{52\cdot 51\cdot 50\cdot \cancel{49!}}{6\cdot \cancel{49!}}$

$= \frac{132,600}{6} = \boxed{22,100}$

(b)

	# ways	Ex:
Step 1: Pick face value for pair.	$\binom{13}{1} = 13$	2 2 ☐
Step 2: Pick two suits for pair	$\binom{4}{2} = 6$	2♥ 2♠ ☐
Step 3: Pick last card. Can't be one of the pair.	$\binom{52-4}{1} = \binom{48}{1}$ $= 48$	2♥ 2♠ K♣

probability is $\frac{13\cdot 6\cdot 48}{22,100} = \frac{3,744}{22,100} \approx \boxed{0.169\ldots}$

$\approx \boxed{16.9\%}$

5 (a) $\binom{10}{2} = \frac{10!}{2!\,8!} = \frac{10 \cdot 9 \cdot \cancel{8!}}{2 \cdot \cancel{8!}} = 5 \cdot 9 = \boxed{45}$

(b) # ways to pick one black ball and one orange ball is $\binom{3}{1} \cdot \binom{4}{1} = 3 \cdot 4 = 12$

probability is $\frac{12}{45} \approx \boxed{0{,}26\overline{6}}$

$\approx \boxed{26.7\,\%}$

(c) # ways to pick two balls both with an odd # on them is

$$\binom{5}{2} = \frac{5!}{2!\,3!} = \frac{5 \cdot 4 \cdot \cancel{3!}}{2 \cdot \cancel{3!}} = 10$$

probability is $\frac{10}{45} \approx \boxed{0{,}2\overline{2}}$

$\approx \boxed{22.2\,\%}$