Ex 3

a) $P(Ace|Diamond) = P \frac{(Ace\ and\ Diamond)}{Diamond} = \frac{\frac{1}{52}}{\frac{13}{52}} = \frac{1}{13}$

* there are 4 aces in the deck, and all we got 52 cards, so the probability of getting ace is $\frac{4}{52}$

* there are 13 diamonds cards in the deck, and all we got 52 cards, so the probability of getting diamond card is $\frac{13}{52}$

* $P(Ace\ and\ Diamond) = P(Ace) * P(Diamond) = \frac{4}{52} * \frac{13}{52} = \frac{1}{52}$

b) $P(Ace|King) = 0$

* we can't get any aces from king cards

c) $P(Ace|6) = 0$

* we can't get any aces from 6s cards(шестерок)

d) $P(Ace|Ace) = 1$

* all cards from aces are aces

e) $P(6|Spade) = \frac{P(6\ and\ Spade)}{P(Spade)} = \frac{\frac{1}{52}}{\frac{13}{52}} = \frac{1}{13}$

* there are 4 6s(шестерок) in the deck, and all we got 52 cards, so the probability of getting 6 is $\frac{4}{52}$

* there are 13 Spade cards in the deck, and all we got 52 cards, so the probability of getting Spade card is $\frac{13}{52}$

* $P(6\ and\ Spade) = P(6) * P(Spade) = \frac{4}{52} * \frac{13}{52} = \frac{1}{52}$

f) it's the same with task a

Ex 4

a) $P(Jack\ after\ Jack) = P(Jack) * P(Jack\ after\ Jack) = \frac{4}{52} * \frac{3}{51} = \frac{1}{221}$

* there are 4 jacks in the deck, and all we got 52 cards, so the probability of getting jack is $\frac{4}{52}$

* there are 3 jacks left and 51 cards left at all

b) $P(King\ after\ Jack) = P(King) * P(Jack) = \frac{4}{51} * \frac{4}{52} = \frac{4}{663}$

* there are 4 jacks in the deck, and all we got 52 cards, so the probability of getting jack is $\frac{4}{52}$

* there are 51 cards left and 4 of them are kings, so the probability is $\frac{4}{51}$

c) $P(7\ after\ no\ Jack) = P(no\ Jack) * P(7) = \frac{12}{13} * \frac{4}{51} = \frac{16}{221}$

* $P(Jack) = \frac{4}{52}, then\ P(no\ Jack) = 1 - \frac{4}{52} = \frac{12}{13}$

*there are 4 7s(семерок) in the deck and there 51 cards left, so the probability of getting 7 is $\frac{4}{51}$

Ex 5

a) $P(Jack, Jack, Jack) = P(Jack) * P(Jack) * P(Jack) = \frac{4}{52} * \frac{3}{51} * \frac{2}{50} = \frac{1}{5525}$

* there are 4 jacks in the deck, and all we got 52 cards, so the probability of getting jack is $\frac{4}{52}$

b)) $P(Jack, Jack, Jack, Jack, Jack)$ = 0

* we haven't got 5 jacks in the deck ☹

c)$P(Jack, King, 6, 7) = P(Jack) * P(King) * P(6) * P(7) = \frac{4}{52} * \frac{4}{51} * \frac{4}{50} * \frac{4}{49} = \frac{32}{812175}$

* there are 4 jacks in the deck, and all we got 52 cards, so the probability of getting jack is $\frac{4}{52}$

* there are 4 kings in the deck and 51 left, so the probability of getting king is $\frac{4}{51}$

* there are 4 6s(шестерки) in the deck and 50 cards left, so the probability of getting 6 is $\frac{4}{50}$

* there are 4 7s(семерок) in the deck and 49 cards left, so the probability of getting 7 is $\frac{4}{49}$

d) $P(2, 3, 4, 5, 6, 7, 8, 9, 10, Jack, Queen, King, Ace) = P(2) * P(3) * P(4) * P(5) * P(6) * P(7) *$
$P(8) * P(9) * P(10) * P(Jack) * P(Queen) * P(King) * P(Ace) = \frac{4}{52} * \frac{4}{51} * \frac{4}{50} * \frac{4}{49} * \frac{4}{48} * \frac{4}{47} * \frac{4}{46} * \frac{4}{45} *$
$\frac{4}{44} * \frac{4}{43} * \frac{4}{42} * \frac{4}{41} * \frac{4}{40} = \frac{4096}{2413347817621535625}$ (it's almost impossible☹)

* there are 4 2s(двойки) in the deck, and all we got 52 cards, so the probability of getting 2 is $\frac{4}{52}$

* there are 4 3(тройки) in the deck and 51 left, so the probability of getting 3 is $\frac{4}{51}$

* there are 4 4s(четверки) in the deck and 50 cards left, so the probability of getting 4 is $\frac{4}{50}$

* there are 4 5s(пятерки) in the deck and 49 cards left, so the probability of getting 5 is $\frac{4}{49}$

* there are 4 6s(шестерки) in the deck and 48 cards left, so the probability of getting 6 is $\frac{4}{48}$

* there are 4 7s(семерок) in the deck and 47 cards left, so the probability of getting 7 is $\frac{4}{47}$

* there are 4 8s(семерок) in the deck and 46 cards left, so the probability of getting 8 is $\frac{4}{46}$

* there are 4 9s(девяток) in the deck and 45 cards left, so the probability of getting 9 is $\frac{4}{45}$

* there are 4 10s(десяток) in the deck and 44 cards left, so the probability of getting 10 is $\frac{4}{44}$

* there are 4 jacks in the deck and 43 cards left, so the probability of getting jack is $\frac{4}{43}$

* there are 4 queens in the deck and 42 cards left, so the probability of getting queen is $\frac{4}{42}$

* there are 4 kings in the deck and 41 cards left, so the probability of getting king is $\frac{4}{41}$

* there are 4 aces in the deck and 40 cards left, so the probability of getting ace is $\frac{4}{40}$

e) $P(Jack, no\ Jack, Jack, no\ Jack) = P(Jack) * P(no\ Jack) * P(Jack) * P(no\ Jack) = \frac{4}{52} * \frac{16}{17} * \frac{3}{50} * \frac{47}{49} = \frac{1128}{270725}$

* there are 4 jacks in the deck, and all we got 52 cards, so the probability of getting jack is $\frac{4}{52}$

* there are 3 jacks left and 51 cards left at all, so the probability of Jack is $\frac{3}{51}$ then the probability of no jack is $1 - \frac{3}{51} = \frac{16}{17}$

* there are 3 jacks left and 50 cards left at all, so the probability of Jack is $\frac{3}{50}$

* there are 2 jacks left and 49 cards left at all, so the probability of Jack is $\frac{2}{49}$ then the probability of no jack is $1 - \frac{2}{49} = \frac{47}{49}$