1.

(a) [A:S1 , B:S1]

(b) S1 is a strictly dominant strategy for A.

$\boxed{\therefore A: S1}$

(c) No.

There is no always better strategy for B regardless of what A plays.

For instance, if B plays S1, then [A:S1 , B:S1] is the best.

However, if A switches to S2, then [A : S2 , B: S3] is better than [A:S2, B:S1] for B.

∴ B has no stricty dominant strategy.

(d) [A:S1, B:S1] => [A=5 , B=9]

There is no other oUtcome that A and B would prefer.

∴ Pareto optimal outcome = (A=5, B=9)

(e) Since there is a pure Nash equilibrium, this game is not a zero-sum game.

2.

(a) i) Mixed Strategy for A.

[S1 : p , S2 : 1-p]

B's ~~expe~~ payoff for S1

: $-2p + 3(1-p) = 3-5p$

B's payoff for S2

: $5p - 4(1-p) = 9p - 4$

$3-5p = 9p-4 \Rightarrow 7 = 14p \Rightarrow p = \frac{1}{2}$ $\boxed{\therefore [S1 : \tfrac{1}{2}, S2 : \tfrac{1}{2}]}$

ii) Mixed strategy for B.

[S1: q , S2: 1-q]

A's payoff for S1

: $2q - 5(1-q) = 7q - 5$

A's payoff for S2

$-3q + 4(1-q) = 4 - 7q$

$4-7q = 7q-5 \Rightarrow 9 = 14q \Rightarrow q = \frac{9}{14}$

$\boxed{\therefore [S1 : \tfrac{9}{14}, S2 : \tfrac{5}{14}]}$

(b)

i) A's expected pay off $= 4 - 7q = 4 - 7 \cdot \frac{9}{14} = 4 - \frac{9}{2} = -\frac{1}{2}$

$\boxed{\therefore -\frac{1}{2}}$

ii) B's expected payoff $= 9p - 4 = 9 \cdot \frac{1}{2} - 4 = \frac{1}{2}$

$\boxed{\therefore \frac{1}{2}}$