1(a) In best of 9 game series, First to win 5 wins the series.

$P(A) = 55\% \Rightarrow 0.55$ } First
$P(1-P(A)) \Rightarrow = 1-0.55 \Rightarrow 0.45$ } frame.

Assumption: A has to win only 4 more from the remaining 8 games.

$P(A) = 0.50$ (winning)
~~PE~~ $1-P(A) = 0.50$ (not winning).

The assumption is A is winning the games straight.

we use binomial distribution for solving this problem.

Because we have data for first frame only.
Every game A has 50-50% to win or lose

P $x = 8$
$n = 4$
$p = 0.5$
$1-p = 0.5$

$$8C_4 \times (0.5)^4 \times (0.5)^{8-4}$$

$\Rightarrow$

$\frac{8\times7\times\cancel{6}^{2}\times5}{\cancel{4}\times\cancel{3}\times\cancel{2}\times1} \cancel{\times 4!} \frac{}{4!} \times(0.5)^{4}\times(0.5)^{4}$

$70\times 0.\ 0.0625\times 0.0625$

P(n=4) 0.27%

overall probability : P(first frame) + P(n=4)

$\Rightarrow 0.55+0.27$

$\Rightarrow 0.82$ //

$\Rightarrow \boxed{82\%}$

~~P~~ (b)

Assumption : Assuming he wins the remaining 4 games with 0.55%.

$n=8$

$x=4$

$p=0.55$

$1-p=0.45$

$P(4)=8C_4\times(0.55)^4\times(0.45)^4$

$\Rightarrow \frac{8\times7\times\cancel{6}^{2}\times5}{\cancel{4}\times\cancel{3}\times\cancel{2}\times1}\times 0.091\times0.04$

$\Rightarrow 70\times0.091\times0.04$

$\Rightarrow 0.26$

P(A winning the game) = 0.55 + 0.26

$= 0.81$

$\sim \boxed{81\%}$

(b) Atleast 8 frames

Total no. of ~~games~~ frames is 9.

P( 8 out of 9) => $\frac{8}{9}$ => 0.88

$n = 9$

$r = 8, \quad r = 9$

$p = 0.88 \qquad \cancel{r} - p = 0.12.$

when 8 games are played.

$9C_8 \times (0.88)^8 \times (0.12)^1$

$\Rightarrow 9 \times 0.35 \times 0.12$

$\Rightarrow 0.378$

P(~~9 out of 9~~) => wh

when 9 games are played

$\Rightarrow 9C_9 \times (0.88)^9 \times (0.12)^0$

$\Rightarrow 1 \times 0.316$

Probability of playing atleast 8 frames
$\Rightarrow 0.694$
$= \boxed{69.4\%}$

(c) Level of odds.

i) we need to calculate B's winning probability.

Let us assume B's winning probability $\Rightarrow 0.45$

$P(B) = 0.45$
$1 - P(b) = 0.55$

Player B has to win 5 matches from 8 remaining.

$n = 8$
$x = 5$
$p = 0.45 \quad 1-p = 0.55$

$P(5) = 8C_5 \times (0.45)^5 \times (0.55)^3$

$\Rightarrow \frac{8 \times 7 \times 6}{3 \times 2 \times 1} \times 0.018 \times 0.166$

$\Rightarrow 56 \times 0.018 \times 0.166$

$\Rightarrow 0.167$

$P(B \text{ winning}) \Rightarrow 0.45 + 0.167$
$\Rightarrow 0.627$ //

Converting probability to odds

$$\text{odd} \Rightarrow \frac{\text{Probability of winning}}{1 - P(\text{winning})}$$

$$\Rightarrow \frac{0.627}{1-0.627} \Rightarrow \frac{0.627}{0.373}$$

$$\Rightarrow 1.68$$

2) a A ⇒ 1.5 B = 1.25

Football has 3 ~~pos~~ outcomes ⇒ win, Lo

$$P(w) = \frac{1}{3} \Rightarrow 0.33$$

$$P(\text{Draw}) = 1/3 \Rightarrow 0.33$$