odds against red = \frac{P(\text{not red})}{P(\text{red})} = \frac{\frac{5}{8}}{\frac{3}{8}} = \frac{5}{3} 

(5:3 \text{ odds against red})
$P(A^+) = 0.34$

47 odds against $A^+ = \frac{P(\text{not } A^+)}{P(A^+)}$

$= \frac{0.66}{0.34}$

$= \frac{33}{17}$

33:17 odds against $A^+$
\[ \frac{123}{49} \]

\[
\text{odds in favor } O^+ \text{ or } O^- = \frac{P(O^+ \text{ or } O^-)}{P(\text{not } (O^+ \text{ or } O^-))}
\]

\[
= \frac{.37 + .06}{.57}
\]

\[
= \frac{.43}{.57}
\]

\[
= \frac{43}{57}
\]

\[43:57 \text{ in favor of } O^+ \text{ or } O^-\]
Odds in favor of win 8:5

a) \( P(\text{win}) = \frac{8}{13} \)

For every 8 wins there are 5 losses.

b) \( P(\text{not win}) = \frac{5}{13} \)
12.4 Expectation
or (Expected Value)

Expectation - is what I can expect (anticipate) I will gain or lose on the average per play, if I play a game many, many times.
Ex: I sell 100 tickets for $1 each. One brings in $50. What is your expectation if you buy 1 ticket?

\[ E = P(\text{won}) \times (\text{gain}) + P(\text{lost}) \times (\text{loss}) \]

\[ E = \frac{1}{100} (49) + \frac{99}{100} (-1) \]

\[ E = \frac{49}{100} - \frac{99}{100} \]

\[ E = -\frac{50}{100} \]

\[ E = -0.50 \]

This means

If I were to play this game many, many times, I would expect to lose on the average $0.50 for each ticket bought.

Fair Price = Expectation + Cost

\[ = -0.50 + 1 \]

\[ \text{Fair Price} = 0.50 \]
Ex. I sell 100 tickets for $1 each.

one (1) 1st prize = 200
two (2) 2nd prizes = 50 each
If you buy one ticket, then what is your expectation?

\[ E = \frac{97}{100} \cdot (1) + \frac{1}{100} \cdot (100) + \frac{1}{100} \cdot (-45) \]
\[ E = \frac{95}{100} + \frac{90}{100} - \frac{45}{100} \]
\[ E = \frac{385}{100} - \frac{485}{100} \]
\[ E = -\frac{100}{100} \]
\[ E = -1 \]

If you play this game many, many times, then you can expect to lose on the average $1 for each ticket bought.

Fair Game: \( E = 0 \)

Fair Price = Expectation + Cost of ticket
Fair Price = \((-1) + 5\)
Fair Price = $4
Monday

12. 4 Do those assigned