1. (a) \( f(a) = f(0) = 0.2; f(b) = f(2) = 50 \)

\[
I = (b - a) \frac{f(b) + f(a)}{2} = (2 - 0) \times \frac{(0.2 + 50.2)}{2} = 50.4
\]

True solution = 50.4 (because \( f(x) \) is a linear function).
Relative percentage error = 0

(b) \( I = (b - a) \frac{f(b) + f(a)}{2} = (2 - 0) \times \frac{(0.2 + 62.2)}{2} = 62.4 \)

True solution = 58.4 (because \( f(x) \) is a non-linear function).
Relative percentage error = \( \frac{|58.4 - 62.4|}{58.4} \times 100\% = 6.85\% \)

2. \( f(0) = 0.2; \ f(1) = 30.2; \ f(2) = 94.2 \)

\[
I = (b - a) \frac{f(0) + 4f(1) + f(2)}{6} = 71.73
\]

True solution = 71.2
Relative percentage error = \( \frac{|71.2 - 71.73|}{71.2} \times 100\% = 0.7\% \)

3. \( x_0 = 0; \ x_1 = 1/2; \ x_2 = 1; \ x_3 = 3/2; \ x_4 = 2 \)

\[
I = \frac{h}{2} (f(x_0) + 2f(x_1) + 2f(x_2) + 2f(x_3) + f(x_4)) = 1.81948
\]

True solution = 1.88562
Relative percentage error = \( \frac{|1.88562 - 1.81948|}{1.88562} \times 100\% = 3.5\% \)

4. \[
I = \frac{h}{3} (f(x_0) + 4f(x_1) + 2f(x_2) + 4f(x_3) + f(x_4)) = 1.8569367
\]

True solution = 1.88562
Relative percentage error = \( \frac{|1.88562 - 1.8569367|}{1.88562} \times 100\% = 1.52\% \)

5. \( E_{trap} = -\frac{(b-a)^3}{12} f''(x') \)

\( a < x' < b \); error is constant for second order, but for third order onwards it changes for diff. \( f(x) \) and diff \( x' \).

\[ E_{Simp} = -\frac{(b-a)^5}{2880} f^{(4)}(x') \]

first to third order it is exact, fourth order constant value, fifth order onwards changes.