Linear Algebra, Numeircal and Complex Analysis (MA11004)
Department of Mathematics
Indian Institute of Technology Kharagpur
Tutorial Sheet 8 - Answers/Hints, Spring 2025

Q.1 **Ans:** $f(5) = 32.9333$
Hint: Use Lagrange's interpolation formula for five nodal points.

Q.2 **Ans:** $\frac{5}{2(x-1)} - \frac{15}{(x-2)} + \frac{31}{2(x-3)}$
Hint: Take $f(x) = 3x^2 + x + 1$ and use Lagrange's interpolation formula for $f(x)$.

Q.3 **Hints:** Use Lagrange's formula for the arguments -3, -1, 1, 3 and then put $x = 0$.

Q.4 **Ans:** 4.07152

Q.5 **Ans:** 9855 feet
Hint: Use trapezoidal formula for $n = 14$.

Q.6 **Ans:** $h \leq 0.0047$
Hint: Error, $E = -\frac{(b-a)h^2}{12} f''(\zeta)$, $\zeta \in (a, b)$

Q.7 **Ans:** $2h\left(\frac{ah^2}{3} + c\right)$
Hint: $I = \int_{-h}^{h} f(x)\,\mathrm{d}x$

Q.8 **Ans:** 1.8278472
Hint: Apply Simpson's $\frac{1}{3}$rd rule.

Q.9 **Ans:** (a) n=15, (b) n=4
Hint: (a) In case of Trapezoidal rule, $|E| \leq \dfrac{(b-a)}{12} h^2 M \leq 10^{-4}$, where M is the maximum value of $\left|f''(x)\right|$ on the interval $[a, b]$. Here, $a = 0$, $b = 2$.
(b) In case of Simpson's $\frac{1}{3}$rd rule, $|E| \leq \dfrac{(b-a)}{180} h^4 M \leq 10^{-4}$, where M is the maximum value of $\left|f^4(x)\right|$ on the interval $[a, b]$.