Multiple-Choice Test

Chapter 07.08
Simpson 3/8 Rule For Integration

1. Simpson 3/8 rule for integration is mainly based upon the idea of

   (A) approximating $f(x)$ in $I = \int_a^b f(x)dx$ by a cubic polynomial
   (B) approximating $f(x)$ in $I = \int_a^b f(x)dx$ by a quadratic polynomial
   (C) Converting the limit of integral limits $[a,b]$ into $[-1,+1]$
   (D) Using similar concepts as Gauss quadrature formula

2. The exact value of $\int_1^4 (e^{-2x} + 4x^2 - 8)\,dx$ most nearly is

   (A) 6.0067
   (B) 5.7606
   (C) 60.0675
   (D) 67.6075

3. The approximate value of $\int_1^4 (e^{-2x} + 4x^2 - 8)\,dx$ by a single application of Simpson's 3/8 rule is

   (A) 61.3740
   (B) 60.0743
   (C) 59.3470
   (D) 58.8992

4. The approximate value of $\int_1^4 (e^{-2x} + 4x^2 - 8)\,dx$ by a multiple-segment Simpson's 3/8 rule with n=6 segments is most nearly

   (A) 60.8206
   (B) 60.6028
   (C) 61.0677
   (D) 60.0675

5. The approximate value of $\int_1^4 (e^{-2x} + 4x^2 - 8)\,dx$ by combination of Simpson's 1/3 rule (n=6 segments) and Simpson's 3/8 rule (n=3 segments) most nearly is

(A) 60.0677
(B) 59.0677
(C) 61.0677
(D) 59.7607

6. Comparing Simpson's 3/8 rule truncated error formula

$$E_t = -\frac{(b-a)^5}{6480} \times f^{(4)}(\zeta),\ a \le \zeta \le b\,,$$

with Simpson's 1/3 rule truncated error formula

$$E_t = -\frac{(b-a)^5}{2880} f^{(4)}(\zeta),\quad a < \zeta < b$$

the following conclusion can be made.

(A) Simpson's 3/8 rule is significantly more accurate than Simpson's 1/3 rule
(B) It is worth it in terms of computational efforts versus accuracy to use Simpson's 3/8 rule instead of Simpson's 1/3 rule.
(C) It is worth it in terms of computational efforts versus accuracy to use Simpson's 3/8 rule instead of Simpson's 1/3 rule.
(D) Simpson's 3/8 rule is less accurate than Simpson's 1/3 rule.