## **Solution 21.3**

(a) Analytical solution:

$$\int_{-2}^{4} (1 - x - 4x^3 + 2x^5) dx = \left[ x - \frac{x^2}{2} - x^4 + \frac{x^6}{3} \right]_{-2}^{4} = 1104$$

**(b)** Trapezoidal rule (n = 1):

$$I = (4 - (-2))\frac{-29 + 1789}{2} = 5280$$
  $\varepsilon_t = \left|\frac{1104 - 5280}{1104}\right| \times 100\% = 378.26\%$ 

(c) Trapezoidal rule (n = 2):

$$I = (4 - (-2))\frac{-29 + 2(-2) + 1789}{4} = 2634 \quad \varepsilon_t = 138.59\%$$

Trapezoidal rule (n = 4):

$$I = (4 - (-2))\frac{-29 + 2(1.9375 - 2 + 131.3125) + 1789}{8} = 1516.875 \qquad \varepsilon_t = 37.398\%$$

(**d**) Simpson's 1/3 rule (n = 2):

$$I = (4 - (-2)) \frac{-29 + 4(-2) + 1789}{6} = 1752$$
  $\varepsilon_t = 58.7\%$ 

(e) Simpson's 3/8 rule:

$$I = (4 - (-2))\frac{-29 + 3(1+31) + 1789}{8} = 1392 \quad \varepsilon_t = 26.087\%$$

(f) Boole's rule (n = 5):

$$I = (4 - (-2))\frac{7(-29) + 32(1.9375) + 12(-2) + 32(131.3125) + 7(1789)}{90} = 1104 \qquad \varepsilon_t = 0\%$$

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