Solution 21.5

Analytical solution:

$$\int_{-3}^{5} (4x-3)^3\,dx = \left[\frac{1}{16}(4x-3)^4\right]_{-3}^{5} = 2056$$

Simpson's rule (n = 4):

$$I = (5-(-3))\frac{-3375+4(-343+729)+2(1)+4913}{12} = 2056 \qquad \varepsilon_t = 0\%$$

Simpson's rules (n = 5):

$$I = (0.2-(-3))\frac{-3375+4(-636.056)-10.648}{6}$$
$$+(5-0.2)\frac{-10.648+3(74.088+1191.016)+4913}{8} = -3162.6+5218.598 = 2056 \qquad \varepsilon_t = 0\%$$

Because Simpson's rules are perfect for cubics, both versions yield the exact result for this cubic polynomial.

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