Trapezoidal Rule:

If f is continuous of [a, b] and if a regular partition of [a, b] is determined by $a = x_0, x_1, x_2, \ldots, x_n$, then

$$\int_a^b f(x)dx \approx \frac{b-a}{2n}[f(x_0)+2f(x_1)+2f(x_2)+\ldots+2f(x_{n-1})+f(x_n)]$$

Simpson's Rule:

Suppose f is continuous on $[a, b]$ and n is an even integer.

If a regular partition is determined by $a = x_0, x_1, x_2, \ldots, x_{n-1}, x_n = b$, then

$$\int_a^b f(x)dx \approx \frac{b-a}{3n}[f(x_0)+4f(x_1)+2f(x_2)+4f(x_3)+\ldots+2f(x_{n-2})+4f(x_{n-1})+f(x_n)]$$

Find the definite integral $\int_0^3 \left(x^2+4\right)dx$.

a) Using Trapezoidal Rule with $n = 4$,

approximate value of $\int_0^3 \left(x^2+4\right)dx =$ 21.18

b) Using Simpson's Rule with $n = 4$,

approximate value of $\int_0^3 \left(x^2+4\right)dx = 21$

Find the definite integral $\int_0^1 \frac{1}{(x+7)^2}dx$.

a) Using Trapezoidal Rule with $n = 4$,

approximate value of $\int_0^1 \frac{1}{(x+7)^2}dx = 0.017867163338$

b) Using Simpson's Rule with $n = 4$,

approximate value of $\int_0^1 \frac{1}{(x+7)^2}dx = 0.017857157875$

Find the definite integral $\int_0^{\pi} \sin(x+5)dx.$

a) Using Trapezoidal Rule with n = 4,

approximate value of $\int_0^{\pi} \sin(x+5)dx$ = 0.537857230583

b) Using Simpson's Rule with n = 4,

approximate value of $\int_0^{\pi} \sin(x+5)dx$ = 0.568617801099

Find the definite integral $\int_3^4 \cos^2(4x)dx.$

Note: $\int_3^4 \cos^2(4x)dx = \int_3^4 \left[\cos(4x)\right]^2 dx.$

a) Using Trapezoidal Rule with $n = 400$,

approximate value of $\int_3^4 \cos^2(4x)dx. =$ 0.591059779758

b) Using Simpson's Rule with $n = 400$,

approximate value of $\int_3^4 \cos^2(4x)dx. =$ 0.591062815286