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Instructor: Muhammad Awais	**Book:** Thomas' Calculus Early Transcendentals, 14e
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Evaluate $\int_3^6 \frac{2x^5}{x^3-2}dx$.

Before integrating, divide the impoper fraction to get a quotient with a remainder expressed as a fraction.

$$\frac{2x^5}{x^3-2} = 2x^2 + \frac{4x^2}{x^3-2}$$

$$\int_3^6 \frac{2x^5}{x^3-2}dx = \int_3^6 2x^2 dx + \int_3^6 \frac{4x^2}{x^3-2}dx$$

The first of the integrals can be evaluated using the Power Rule. If the second integral is expressed as $\frac{4}{3}\int_3^6 \frac{3x^2}{x^3-2}dx$, the integrand with $u = x^3 - 2$ has the form $\frac{du}{u}$.

Since $\int \frac{du}{u} = \mathbf{ln}\,|u| + C$,

$$\int_3^6 2x^2 dx + \frac{4}{3}\int_3^6 \frac{3x^2}{x^3-2}dx = \frac{2}{3}x^3\Big]_3^6 + \frac{4}{3}\,\mathbf{ln}\,\left|x^3-2\right|\Big]_3^6$$

$$= 126 + \frac{4}{3}\,\mathbf{ln}\left(\frac{214}{25}\right)$$

$= 128.863$, rounded to the nearest thousandth.