1 What you don’t have to memorize

Reduction formulas:

\[
\int \sin^n(x) \, dx = -\frac{1}{n} \sin^{n-1}(x) \cos(x) + \frac{n-1}{n} \int \sin^{n-2}(x) \, dx
\]

\[
\int \cos^n(x) \, dx = \frac{1}{n} \cos^{n-1}(x) \sin(x) + \frac{n-1}{n} \int \cos^{n-2}(x) \, dx
\]

\[
\int \sin^n(x) \, dx = \frac{1}{n-1} \sec^{n-2}(x) \tan(x) + \frac{n-2}{n-1} \int \sec^{n-2}(x) \, dx
\]

etc

Half-angle formulas, double-angle formulas, and sum/difference formulas for \( \sin, \cos, \) etc.

Integrals of \( \tan \theta, \cot \theta, \sec \theta, \) and \( \csc \theta. \)

The trapezoidal and Simpson’s rule for approximate integration.

Error estimates for approximate integration.

2 What you have to memorize

Anything not explicitly on the ‘don’t have to memorize’ list.

\( \sin^2 \theta + \cos^2 \theta = 1 \)

\( 1 + \tan^2 \theta = \sec^2 \theta \)

Derivatives of \( \sin \theta, \cos \theta, \tan \theta, \cot \theta, \sec \theta, \) and \( \csc \theta. \)

Integrals of \( \sin \theta \) and \( \cos \theta. \)

Both version of the Fundamental Theorem of Calculus.
Both version of the chain rule:

\[
\frac{df}{dx} = \frac{df}{du} \frac{du}{dx} \quad \text{and} \quad (f \circ g)'(x) = f'(g(x)) \cdot g'(x).
\]

Substitution in integrals.
Integration by parts.
Trigonometric integrals.
Trigonometric substitution.
Partial fraction expansion.
Long division.
The Left-hand, Right-hand, and midpoint rules for approximate integration.
How to evaluate both types of improper integrals using limits.
L'Hôpital's rule
How to find the area bounded by two (or more) curves.
How to find the volume of solids of revolution (shells, disks, washers).
How to find the volume of solids by slicing.