

Homework Assignment for Week 16

1. Section 8.2: Problems 5, 11, 15, 23, 25, 27, 29, 33, 35, 43, 45, 51, 63, 71, 75, 76.
2. Section 8.3: Problems 11, 17, 27, 28, 33, 34, 35, 37, 45, 57, 63, 65, 67.
3. Section 8.3: Derive formula 75 76 of 'A brief table of integrals' near the end of the text-book (take $a = 1$ for simplicity). Then derive similar formula for $\int (\tan^m x)(\sec^n x) dx$.
4. Section 8.4: Problems 3, 5, 13, 23, 35, 37, 45, 47, 48, 54, 57.

Some hints:

$\int e^{ax} \cos(bx) dx$ or $\int e^{ax} \sin(bx) dx$: integration by part twice.

$\int \frac{f(x)}{g(x)} dx$ where $f(x)$ and $g(x)$ are polynomials: if $\deg f \geq \deg g$, carry out the division, find the quotient and ratio, make sure that $\deg f < \deg g$ afterwards.

computations involving antiderivative of $\tan^2 x$: try $\tan^2 x = \sec^2 x - 1$

$\int f(x) \ln x dx$: try $y = \ln x$, $x = e^y$ and proceed.

$\int \frac{\sin^{2l} x}{\cos^{2k+1} x} dx$: multiply the factor $\frac{\cos x}{\cos x}$ and proceed. May need the technique of partial fraction (section 8.5) in the end.

Similarly for $\int \frac{\cos^{2k} x}{\sin^{2l+1} x} dx$ ($\times \frac{\sin x}{\sin x}$), $\int \frac{\tan^{2k+1} x}{\sec^n x} dx$ ($\times \frac{\sec x}{\sec x}$), $\int \frac{\sec^n x}{\tan^{2k+1} x} dx$ ($\times \frac{\tan x}{\tan x}$),
or $\int \frac{\tan^m x}{\sec^{2l} x} dx$ ($\times \frac{\sec^2 x}{\sec^2 x}$).