Mathematics 134 – Calculus with Fundamentals 2
Practice Recognizing Methods for Integrals
March 28, 2018

*Background*

In many cases, dealing with integrals effectively involves

- Recognizing which method might apply from the form of the function, *and*

- Making a preliminary *u-substitution* to put the integral you want into a basic form.

- In addition, tables of integrals extending our table of trigonometric reduction formulas (and, nowadays, symbolic mathematical software) are often used for these tasks.

Today we want to practice recognizing which forms apply and doing the necessary substitutions.

*Discussion Problems*

A) Do a preliminary substitution based on the form and integrate:

1) $\int \dfrac{x}{\sqrt{x+2}}\, dx.$

2) $\int \tan^3(\ln(x))\dfrac{dx}{x}.$

3) $\int \dfrac{\sin x}{\cos^2 x + 6\cos x + 8}\, dx.$

   (Hint: Either before or after you substitute, you will also want to complete the square on the bottom.)

4) $\int x^{3/2} e^{x^{1/2}}\, dx.$

B) Each of the integrals below looks very much like the others, but they are actually quite different forms. For each, say which method and/or table entries you need, and do the integration:

1) $\int \dfrac{x}{\sqrt{9-x^4}}\, dx$

2) $\int \dfrac{x}{\sqrt{9-x^2}}\, dx$

3) $\int \dfrac{1}{x\sqrt{9-x^2}}\, dx$