

Welcome to Multivariable Calculus!

If you took AP Calculus AB, you may feel concerned that you are underprepared for the class. **Do not worry!** It is my goal to make sure everyone starts on an even playing field.

To that end, I strongly encourage you to spend some time exploring the following integration techniques this summer. **These techniques are covered in AP Calculus BC but NOT in AP Calculus AB.** I will begin the year by re-teaching these techniques, but it will be a fairly quick review. It is therefore to your advantage to study them some on your own this summer.

Khan Academy has some great videos that explain these techniques and show examples. There are also plenty of example problems to try and even mini quizzes you can take to see how well you can use these techniques. Follow the links below to access the videos and practice problems for each technique.

Integration Using Long Division and Completing the Square - <https://www.khanacademy.org/math/ap-calculus-bc/bc-integration-new/bc-6-10/v/integral-partial-fraction>

Integration by Parts - <https://www.khanacademy.org/math/ap-calculus-bc/bc-integration-new/bc-6-11/v/deriving-integration-by-parts-formula>

Integration Using Trig Identities - <https://www.khanacademy.org/math/integral-calculus/ic-integration/ic-integration-with-trig-identities/v/using-trig-identity-to-use-u-substitution>

Integration Using Trig Substitution - <https://www.khanacademy.org/math/integral-calculus/ic-integration/ic-trig-substitution/v/introduction-to-trigonometric-substitution>

Integration Using Partial Fractions - <https://www.khanacademy.org/math/ap-calculus-bc/bc-integration-new/bc-6-12/v/integration-with-partial-fractions>

Once you've spent some time watching these videos and trying the problems, try the worksheet on the next page. Fair warning – it's tough! If you can do these problems, consider yourself an integration master.

I look forward to meeting you in the fall! We're going to have a great year.

Sincerely,

Ms. Doschek

Integration Techniques Summer Worksheet

1. $\int e^{2x} \cos x \, dx$

2. $\int 2x \arctan x \, dx$

3. $\int \frac{\sin^5 x}{\cos x} \, dx$

4. $\int \cos 8x \cos 3x \, dx$

5. $\int \frac{3x}{(4x^2-9)^{\frac{3}{2}}} \, dx$

6. $\int \frac{x^4-3x^3+2x-5}{x^3-4x^2} \, dx$

7. $\int \frac{5}{x^2-6x+10} \, dx$

Hint: If you are stuck or just want to check your answers, visit <https://www.integral-calculator.com/>.