# CALCULUS 12 LG 15-16

INTEGRATION

## INTRODUCTION:

We have spent much of this course concerned with finding the derivative. Now we will look at "going backwards" and taking the integral of a function. If the derivative could be explained by finding the slope of the tangent line, then the integral can be explained by finding the area under a curve.

## LEARNING GUIDE EXPECTATIONS:

On the completion of this learning guide you will be able to:

1) Approximate the area under the curve using the sum of the area of rectangles.
2) Calculate antiderivatives.
3) Integrate by substitution.
4) Use Sigma Notation to find sums and express sums.
5) Calculate definite integrals as areas under a curve.
6) Use the Fundamental Theorem of Calculus to determine the area under a curve.
7) Solve problems involving distance, velocity, and acceleration.
8) Determine the average value of a continuous function on a closed interval.

## EVALUATION:

When you are ready, write the LG 15-16 quiz in the test centre.

## RESOURCES NEEDED:

Calculus 12 text.

www.thssmath.com

## LEARNING ACTIVITIES

**Expectation #1:** Approximate the area under the curve using the sum of the area of rectangles.

1. Watch and take notes on instructional video on Approximating the Area Under a Curve.

2. In Chapter 7.1, read pages 378-382.

3. In your journal, describe, using an example, how you can approximate the area under a curve using rectangles.

4. On page 382, complete questions #1-4.

**Expectation #2:** Calculate antiderivatives.

1. Watch and take notes on instructional video on Anti-derivatives.

2. In Chapter 7.2, read pages 382-389.

3. In your journal, explain what anti-differentiation is and copy the "Integration Formulae" found in table 7.2.1 on page 384.

4. On pages 389-390, complete questions #3-31, 33, 34, 39, 40, 41, 45.

**Expectation #3:** Integrate by substitution.

1. Watch and take notes on instructional video on Integration by Substitution.

2. In Chapter 7.3, read pages 391-394.

3. On pages 395-396, complete questions #1-36, 41, 43-48.

**Expectation #4:** Use Sigma Notation to find sums and express sums.

1. Watch and take notes on instructional video on Sigma Notation.

2. In Chapter 7.4, read pages 397-399.

3. In your journal, describe using an example, how Sigma Notation works.

4. On page 402, complete questions #1-8.

**Expectation #5:** Calculate definite integrals as areas under a curve.

1. Watch and take notes on instructional video on Definite Integral.

 2. In Chapter 7.5, read pages 404-413.

 3. In your journal, describe how the area under a curve can be approximated with areas of rectangles.

 4. On page 414, complete questions #1, 3, 5, 17-28.

 **Expectation #6:** Use the Fundamental Theorem of Calculus to determine the area under a curve.

 1. Watch and take notes on instructional video on Fundamental Theorem of Calculus – Part 1

 2. Watch and take notes on instructional video on Fundamental Theorem of Calculus – Part 2

 3. In Chapter 7.6, read pages 416-425 (ignoring the part on The Mean-Value Theorem for Integrals).

 4. In your journal, explain Part 1 and Part 2 of the Fundamental Theorem of Calculus.

 5. On page 425-427, complete questions #3-24, 27-29, 45-50.

 **Expectation #7:** Solve problems involving distance, velocity, and acceleration.

 **Expectation #8:** Determine the average value of a continuous function on a closed interval.

 1. Watch and take notes on instructional video on Acceleration, Velocity and Distance.

 2. Watch and take notes on instructional video on Average Value of a Function.

 3. In Chapter 7.7, read pages 428-437. (You don't need to know or use the physics formulae from pages 429 and 430)

 4. In your journal, explain how to find the displacement and total distance travelled when you are given a velocity or acceleration function.

 5. In your journal, explain how to find the average value of a continuous function on a closed interval.

 6. On pages 437-440, complete questions #7-18, 29, 49-58.