AP Calculus AB Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Lesson 6-3: *Definite Integrals & Antiderivatives*, Part 1 Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Learning Goal:**

* *I can apply rules for definite integrals.*

In the previous section, we defined as a limit of sums . In doing so, we moved from *left to right* across the interval , so  is always greater than zero. What would happen if we integrated in the *opposite direction*?

If we integrated in the opposite direction, the integralwould become . The integral is again a sum in the form, but this time would become , which would be *less than zero*. This would change the sign on all the terms of the Riemann sum, and ultimately the sign of the definite integral. This idea suggests



Along with the above rule, there are several other rules for dealing with definite integrals. They are listed below (*and will need to be memorized!*)

**Rules for Definite Integrals**

1. *Order of Integration:* 

2. *Zero:* 

3. *Constant Multiple:* 

4. *Sum and Difference:* 

5. *Additivity:* 

6. *Max-Min Inequality:* If max *f* and min *f* are the maximum and minimum values of *f* on , then

 

7. *Domination:* 

 

8. *Unsigned Area:* Since  gives the “signed” area under the curve, then

 gives the total “unsigned” area of 

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**Practice**

Suppose: , , and 

Find each of the following integrals, if possible. Show your set-up using the above information.

(a)  (b) 

(c)  (d) 

(e) Without your calculator, show that the value of is less than  (*hint: use rule # 6 above)*

(f) Recall that . Without the assistance of your calculator, find . Verify your answer

 on your calculator.