**REVIEW: APPLICATIONS OF INTEGRALS**

1. ***MOTION***





Speed =  Parametric speed = 

 Speed is **increasing** if velocity and acceleration have the same sign for a given value of *t*.

1. ***DISPLACEMENT*** (NET DISTANCE TRAVELED)



1. ***POSITION***



1. ***TOTAL DISTANCE TRAVELED***



1. ***AREA***

Rectangular:  (upper – lower)

  (right – left)

Parametric: 

Polar: 

1. ***VOLUME:*** Draw a representative rectangle. Rectangles will be perpendicular to the axis of revolution for discs and washers. Rectangles will be parallel to the axis of revolution for shells. Shells are not specifically tested, but can be very convenient in some situations.

Disc: 

Washer: 

Cross Sections:  where  is the area function for the base

1. ***ARC LENGTH***

Rectangular: 

Parametric: 

Polar: 

1. ***ACCUMULATING RATES OF CHANGE***

Given a rate of change, you can integrate to accumulate over an interval. For example, if  gives the rate, in gallons per hour, that a pollutant pours into Mountain Island Lake, then the number of gallons of pollutant that pours into Mountain Island Lake in the first 5 hours can be found by .

1. ***LOGISTICS DIFFERENTIAL EQUATIONS***

Differential equations in the form will model rates of change for growth that involves

carrying capacity.

* If the *P* inside the parenthesis has coefficient 1, then the constant *L* represents the carrying capacity, or limit to growth. As a result, , regardless of the initial population.
* The population is increasing fastest when .
* To solve this differential equation, separate the variables and integrate both sides.



Partial fractions will be the technique to use. You will not be asked to do this on the test because of time constraints! You will need to know about the first 2 bullets, though.