

## Applications of Unit 7

### Example #1:

Let  $f(x) = x^3 + x^2$ . If  $g$  is the inverse function of  $f$ , find  $g'(2)$ .

### Example #2:

**Use the chart to find the derivative of  $f^{-1}$  when  $x = 9$ .**

$x$	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
1	6	4	2	5
2	9	2	3	1
3	10	-4	4	2
4	-1	3	6	7

**Now find the derivative of  $g^{-1}$  when  $x = 3$ .**

Write an equation for the tangent line to the graph of  $y = f^{-1}(x)$  at  $x = 9$ .

Write an equation for the tangent line to the graph of  $y = g^{-1}(x)$  at  $x = 3$ .

Semester 1 Review: Let  $h(x) = \frac{f(x)}{g(x)}$ . Using the table above, what is  $h'(4)$ ?

Lesson #74

Example #3:

Let R be the region enclosed by  $y = e^x$ ,  $y = 0$ ,  $x = 0$ , and  $x = 2$ .

A. Find the area of R.

B. Find the volume of R when it is revolved about the x-axis.

C. Set up the integral to solve for the volume of R when it is revolved around the line  $y = e^2$ .

D. Set up the integral to solve for the volume of R when it is revolved around the line  $y = -2$ .

Example # 4:

Let R be the region enclosed by  $y = e^x$ ,  $x = 0$ , and  $y = e^2$ . Region R is the base of a solid, where cross sections perpendicular to the y-axis are squares. Write, but do not evaluate, an integral expression to calculate the volume of this solid.