Review Chapter 4
Part 1: Calculator Allowed

1. Be able to evaluate definite integrals on your calculator. The required functions on your calculator are most likely the following:

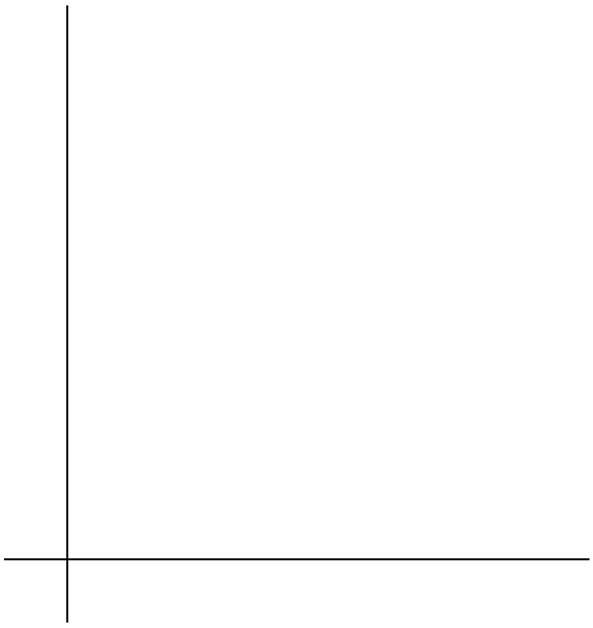
   MATH 9

   fnInt(f(x),x,lower,upper)

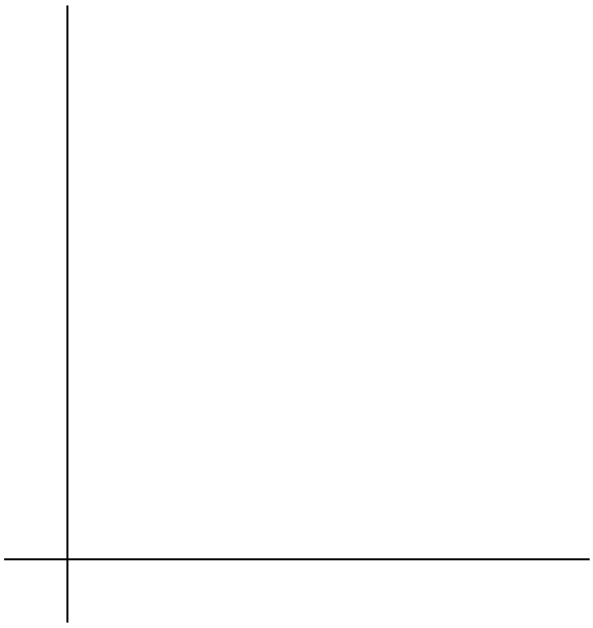
2. Calculate the upper, lower, and midpoint Riemann sums of the following function:

   $f(x) = x^2 + 2$ on $[0, 5]$ with $n = 5$

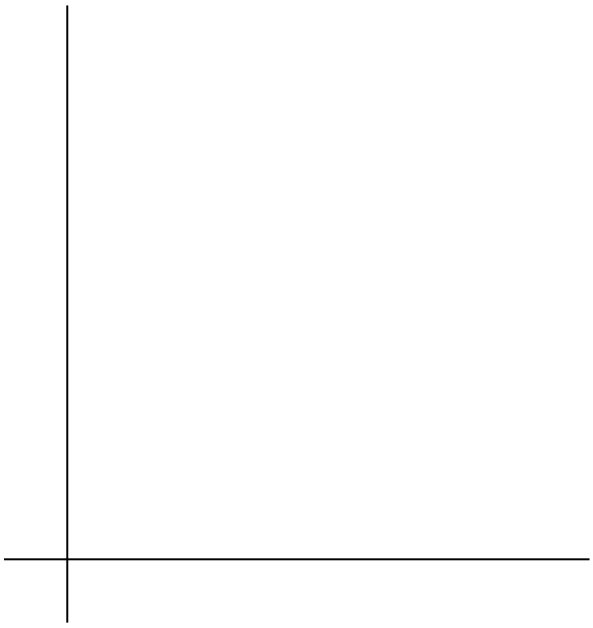
Upper



Lower



Midpoint

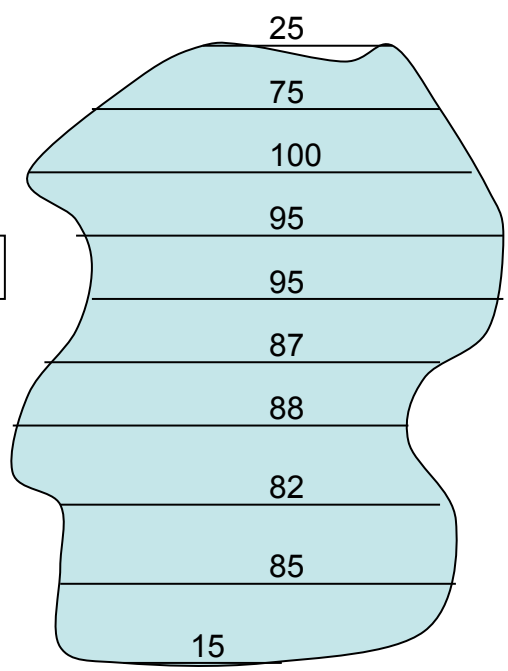


3. Use the Trapezoidal Rule to approximate the following:

$$\int_0^2 x^3 dx, \qquad n = 4$$

4. Approximate the area of the lake using the Trapezoidal Rule.

$\boxed{\Delta x = 15}$



5. Find the area between the given function and the x-axis from -2 to 5.

$$f(x) = x^2 - 2x - 3$$

6. Find the same area using absolute value.

7. A particle moves along the x-axis with the following velocity from 0 to 6 seconds. The particle is in position 4 at time 0. Find the position function, displacement, and total distance traveled.

$$v(t) = t^2 - 7t + 10 \text{ on } 0 \leq t \leq 6$$

8. Know how to solve application problems involving average value and accumulation. Here's a list of one's you've already done for you to review.

   p. 284, exercise 33

   p. 285, exercise 63

   p. 299, exercises 105 and 106

Review Chapter 4
Part 2: No Calculator

9. Write the definition of definite integral.

10. Write the Fundamental Theorem of Calculus.

11. Write the Second Fundamental Theorem of Calculus.

For questions 12−23, find the integrals.

12. $\int \frac{2}{x^3}\,dx$

13. $\int \sqrt{x}(x+2)\,dx$

14. $\int -2\sec x \tan x\,dx$

15. $\int \frac{x^2+2x}{x^4}\,dx$

16. $\int_1^3 (3x^2 + 5x - 4)\,dx$

17. $\int_{\pi/4}^{3\pi/4} \sin x\,dx$

18. $\int 4x^3(x^4 + 2)^2\,dx$

19. $\int \frac{x^2}{\sqrt{1 + x^3}}\,dx$

20. $\int \tan^2 x \sec^2 x \, dx$

21. $\int x\sqrt{x+2}\, dx$

22. $\int_0^4 \frac{1}{\sqrt{2x+1}}\, dx$

23. $\int_0^{\pi/2} \cos\left(\frac{2x}{3}\right) dx$

24. Solve the following differential equation:

$\frac{dy}{dx} = \frac{1}{2}x + 2$ with initial condition $y = 2$ when $x = 4$.

25. Be able to solve “no work” integrals like on page 273 (exercises 33−45) and page 285 (exercises 54−60).

26. Solve using the Second Fundamental Theorem of Calculus.

a. If $F(x) = \int_{3}^{x^3} \sqrt{t}\, dt$, find $F'(x)$.

b. If $F(x) = \int_{-2}^{\cos x} 3t^2 dt$, find $F'(x)$.

27. Find the average value of the following function on the given interval and the x-value where it occurs.

$$f(x) = 3x^2 - 2x \text{ on } [1,4]$$