REVIEW PROBLEMS THAT WILL HELP PREPARE YOU FOR THE TEST

For all the problems which involve using integration to find an arc length, area, or volume, SET UP the correct integral including limits of integration, correctly formatted integrand, and "*dx*" or "*dy*" Then use the fnInt capacity of your calculator with the FRAC key to get the answer (in most cases, this will be the EXACT answer).

Given: $y = 10 - x^2$ $\quad y = 2x + 7$

1. Draw a neat graph of the two functions and find their points of intersection.
   $(1,9), (-3,1)$

2. Find the area of the enclosed region *R*.
   $\int_{-3}^{1} \left(10 - x^2 - 2x - 7\right) dx = \frac{32}{3}$

Find the volumes of the solids that are formed by rotating the region *R* around the given line.

3. The x-axis $\quad \pi \int_{-3}^{1} \left(\left(10 - x^2\right)^2 - \left(2x + 7\right)^2 \right) dx = \frac{704}{5}\pi$
4. $y = -3$ $\quad \pi \int_{-3}^{1} \left(\left(10 - x^2 + 3\right)^2 - \left(2x + 7 + 3\right)^2 \right) dx = \frac{1024}{5}\pi$
5. $y = 12$ $\quad \pi \int_{-3}^{1} \left(\left(12 - 2x - 7\right)^2 - \left(12 - 10 + x^2\right)^2 \right) dx = \frac{576}{5}\pi$
6. $x = 4$ $\quad 2\pi \int_{-3}^{1} \left(4 - x\right)\left(10 - x^2 - 2x - 7\right) dx = \frac{320}{3}\pi$
7. $x = -3$ $\quad 2\pi \int_{-3}^{1} \left(x + 3\right)\left(10 - x^2 - 2x - 7\right) dx = \frac{128}{3}\pi$

Find the volume of the solid for which each cross section perpendicular to the x-axis is the given shape.

8. A rectangle with length in the base and width equal to half the length.
   $\int_{-3}^{1} \frac{\left(10 - x^2 - 2x - 7\right)^2}{2} dx = \frac{256}{15}$

9. An equilateral triangle $\quad \int_{-3}^{1} \frac{\left(10 - x^2 - 2x - 7\right)^2 \sqrt{3}}{4} dx = \frac{128\sqrt{3}}{15}$

10. Find the perimeter of the region (think about how you can find the lengths of each of the parts of the outline of the region and use algebra or calculus as appropriate.
    $\int_{-3}^{1} \sqrt{4x^2 + 1}\, dx + \sqrt{16 + 64} = 11.226 + 8.944 = 20.170$