M182 Lecture Worksheet, Sec. 6.2 and 6.3 **Name:**____________________________

Washers and Disks: First sketch a picture (so you know what you're integrating!) and decide whether to slice horizontally or vertically. Write down the area of a typical cross-sectional slice, and then integrate to "sum up" all the slices.

$$\int_{x=a}^{x=b} A(x)dx \text{ or } \int_{y=a}^{y=b} A(y)dy$$

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1. **Example:** Find the volume of the solid of revolution obtained by rotating the region bounded by $y = x^3$, $y = 8$, and $x = 0$ about the y-axis.

2. **Example:** Find the volume of the solid obtained by rotating the region between $y = x^2$ and $y = x^3$ about the y-axis.

3. **Example:** Find the volume of the solid obtained by rotating the region between the x-axis and the curve $y = 2 - x^2$ about the line $y = 3$.

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4. **Assigned Homework:** Page 448-449, numbers 7, 17, 31, 33

Cylindrical Shells: Always sketch a picture (so you know what you're integrating!) Figure out the height of a typical cylindrical shell (call it $f(x)$) and then integrate to find the volume.

Recall that the formula below is really just the integral of the circumference ($2\pi x$) times the shell height ($f(x)$). It might help to think of cutting the shell and then "unrolling" it; you'd get something that looks like a rectangle with length $2\pi x$ and height $f(x)$.

$$\int_a^b 2\pi x f(x)dx$$

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1. **Examples:** Repeat the examples above, this time using the method of cylindrical shells. Show that you get the same answer.

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2. **Assigned Homework:** pg. 454-455, numbers 1, 3, 7, 19, 21, 25