The Volume Cheat Sheet
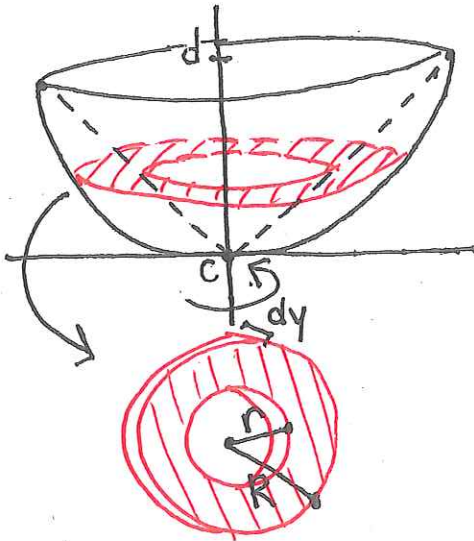
*Note that these are the situations when rotating around axes. Modifications may be required to rotate about other lines.

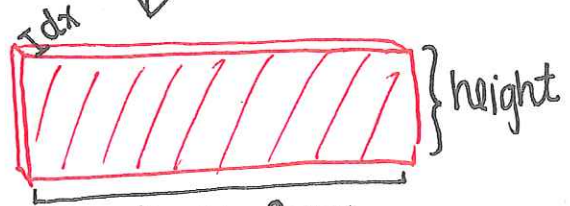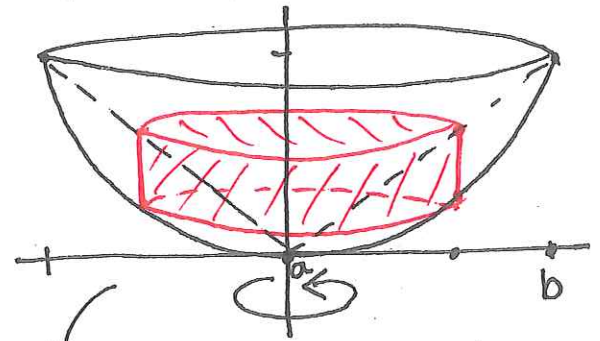|	Disk/Washer	Cylindrical Shells

Rotating about y-axis

Disk/Washer

$$Vol = \int_c^d A(y)\,dy$$

$$A(y) = \pi R^2 - \pi r^2$$

this integral in terms of y
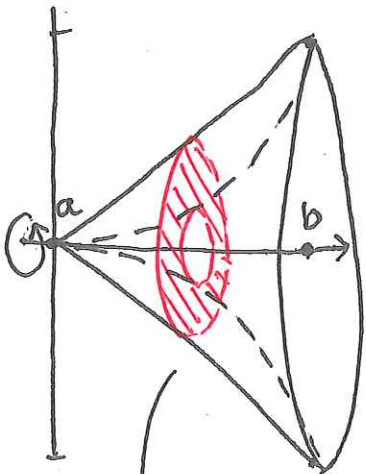
Cylindrical Shells

Circumference = $2\pi x$

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

$f(x) = $ height of a cyl. shell w/ radius x

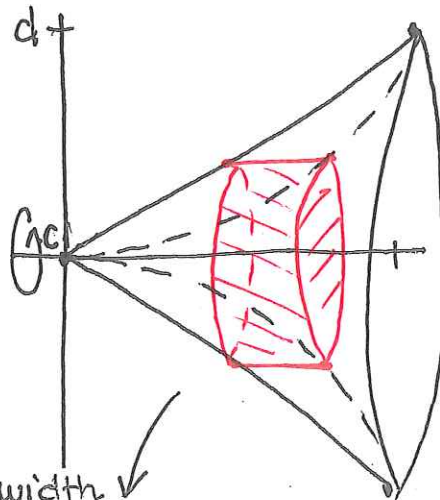* this integral in terms of x*

Rotating about x-axis

Disk/Washer

$$Vol = \int_a^b A(x)\,dx$$

$$A(x) = \pi R^2 - \pi r^2$$

this integral in terms of x

Cylindrical Shells
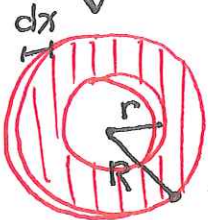
$$Vol = \int_c^d 2\pi y\, f(y)\,dy$$

$f(y) = $ width of a cyl. shell w/ radius y.

Circumference = $2\pi y$

this integral in terms of y