Achievable

Trig identities, area and volume

AP Calc AB dump sheet

Area between curves

- **Vertical slices:**

$$A = \int_a^b [f(x) - g(x)]dx \text{ (upper - lower function)}$$

- **Horizontal slices:**

$$A = \int_{y=c}^{y=d} [f(y) - g(y)]dy \text{ (right - left function)}$$

Volume

Cross-sections:

$V = \int_a^b A(x)dx$, where $A(x)$ = area of cross-section

Washer method:

$$V = \pi\int_a^b [R(x)]^2 dx$$

Disk method:

$$V = \pi\int_a^b ([R(x)]^2 - [r(x)]^2)dx$$

For vertical axes of rotation, integrate using dy (write area A and radii R and r in terms of y)

Trig identities

- **Reciprocal/Quotient identities**

$$sin(\theta) = \frac{1}{csc(\theta)} \qquad csc(\theta) = \frac{1}{sin(\theta)}$$

$$cos(\theta) = \frac{1}{sec(\theta)} \qquad sec(\theta) = \frac{1}{cos(\theta)}$$

$$tan(\theta) = \frac{1}{cot(\theta)} = \frac{sin(\theta)}{cos(\theta)} \qquad cot(\theta) = \frac{1}{tan(\theta)} = \frac{cos(\theta)}{sin(\theta)}$$

- **Pythagorean identities**

$$sin^2(\theta) + cos^2(\theta) = 1$$

$$tan^2(\theta) + 1 = sec^2(\theta)$$

$$1 + cot^2(\theta) = csc^2(\theta)$$

- **Double angle formulas**

$$sin(2\theta) = 2sin(\theta)cos(\theta)$$

$$cos(2\theta) = cos2(\theta) - sin2(\theta)$$

$$= 2cos2(\theta) - 1$$

$$= 1 - 2sin2(\theta)$$

- **Sum and difference formulas**

$$sin(a \pm b) = sin(a)cos(b) \pm cos(a)sin(b)$$

$$cos(a \pm b) = cos(a)cos(b) \mp sin(a)sin(b)$$

$$tan(a \pm b) = \frac{tan(a) \pm tan(b)}{1 \mp tan(a)tan(b)}$$

- **Half angle formulas**

$$cos^2(\theta) = \frac{1}{2}(1 - cos(2\theta))$$

$$sin^2(\theta) = \frac{1}{2}(1 + cos(2\theta))$$