- NEVER FORGET $+C$!
- You need to know

$$\sin^2\theta = \frac{1-\cos 2\theta}{2}, \quad \cos^2\theta = \frac{1+\cos 2\theta}{2}, \quad \sin^2\theta + \cos^2\theta = 1$$

- Remember the sum of the geometric series (when $|r| < 1$, e.g. $r = 1/3$, $r = -5/6$, etc) is

$$\sum_{n=n_0} ar^n = \frac{ar^{n_0}}{1-r} = \frac{\text{first term of series}}{1 - \text{common ratio}}$$

- There will be no work problems, differential equation problems, Root Test (though you can use it), or telescoping series problems on the final exam.
- When you make a u-sub in a definite integral, do not forget to change the upper/lower limits!
- If you are asked to sum a series on the final exam (if it converges), then with 95% certainly the series is a geometric series.
- If a series has a factorial in it, e.g. $n!$, $(2n)!$, etc., then use the Ratio Test. Be careful: $(2(n+1))! = (2n+2)!$.
- If you are given a power series and asked to find the radius and interval of convergence, throw the Ratio Test at it! Do not forget to check the endpoints!
- Remember the Ratio and Root Test never say a series just converges; they say a series converges absolutely.
- Integrals that 'look like'

$$\int \frac{dx}{x^4\sqrt{9-x^2}}, \quad \int \frac{x^3}{\sqrt{1-x^2}}\,dx, \quad \int \frac{dx}{(x^2+4)^{3/2}}, \quad \int \frac{\sqrt{4x^2-9}}{x}\,dx, \quad \int \sqrt{x^2-4}\,dx$$

  all call for Trig Sub.
- Integrals that 'look like'

$$\int \frac{x+2}{(x-1)(x+2)}\,dx, \quad \int \frac{3}{x^2-4}\,dx, \quad \int \frac{2x+5}{x(x^2+3)}\,dx, \quad \int \frac{x^2+2x+1}{(x+1)(x+3)^2}\,dx$$

  all call for Partial Fractions.
- All integrals that 'look like'

$$\int \sec^5\theta\ \tan^5\theta\ d\theta, \quad \int \sin^5\theta\ d\theta, \quad \int \sin\theta^5\theta\ \cos^5\theta\ d\theta$$

  all call for a Trigonometric Integral.

- Don't forget how to do the 'basic integrals', e.g.

$$\int (2x+5)^6 \, dx, \quad \int \frac{dx}{(1-3x)^4}, \quad \int (x+7)^{5/3} \, dx, \quad \int (x+1)(x^2+3)^2 \, dx$$

- Integration by Parts: LIATE (logs, inverse trig, algebraic (polynomials really), trig, exponential), fill in the box, rule of 7 with $-\int$.

- Volumes of Rotation: Shells or Disks. Remember, two l's gets 2π.

$$\text{Shells: } 2\pi \int_a^b \text{ radius } \cdot \text{ `height' } d\sim \qquad \text{Disks: } \pi \int_a^b (\text{outer radius})^2 - (\text{inner radius})^2 \, d\sim$$

- NOTATION IS EVERYTHING FOR IMPROPER INTEGRALS! Do not drop your limits and be careful!

- Arclength:

$$\int_a^b \sqrt{1+(f'(\sim))^2} \, d\sim$$

- Surface Area:

$$2\pi \int \text{ radius } \cdot \sqrt{1+(f'(\sim))^2} \, d\sim$$

  The radius piece will look like x, y, $x+2$, $4-x$, $y+3$, etc. or will be like $f(x)$, $f(y)$, $f(x)+2$, $6-f(y)$, etc.

- Polar Area:

$$\frac{1}{2} \int_\alpha^\beta f(\theta)^2 \, d\theta$$

Function/Angle	$0°$	$30°, \frac{\pi}{6}$	$45°, \frac{\pi}{4}$	$60°, \frac{\pi}{3}$	$90°, \frac{\pi}{2}$	$180°, \pi$	$270°, \frac{3\pi}{2}$
$\sin\theta$	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1	0	-1
$\cos\theta$	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0	-1	0
$\tan\theta$	0	$\frac{\sqrt{3}}{3}$	1	$\frac{1}{2}$	$\pm\infty$	0	$\pm\infty$