Trig formulas

- $\sin^2\theta + \cos^2\theta = 1$
- $\tan^2\theta + 1 = \sec^2\theta \qquad \cot^2\theta + 1 = \csc^2\theta$
- $\sin(2\theta) = 2\sin\theta\cos\theta \qquad \sin^2\theta = \frac{1}{2}(1-\cos(2\theta)) \qquad \cos^2\theta = \frac{1}{2}(1+\cos(2\theta))$

Integration by parts formulas:

- $\int u dv = uv - \int v du \qquad \int \ln x dx = x\ln x - x + C$
- $\int \tan x dx = \ln|\sec x| + C \qquad \int \sec x dx = \ln|\sec x + \tan x| + C$

Area of surface of revolution from $y = f(x)$, $a \le x \le b$:

- Rotation about x-axis: $S = 2\pi\int_a^b f(x)\sqrt{(f'(x))^2+1}\,dx$
- Rotation about y-axis: $S = 2\pi\int_a^b x\sqrt{(f'(x))^2+1}\,dx$

Some formulas for parametric equations:

- $dy/dx = \frac{dy/dt}{dx/dt} \qquad ds = \sqrt{(dx/dt)^2 + (dy/dt)^2}dt$

Polar coordinates and polar curves:

- $\begin{cases} x = r\cos\theta \\ y = r\sin\theta \end{cases} \qquad \begin{cases} r^2 = x^2 + y^2 \\ \tan\theta = y/x \end{cases}$. Area bounded by the polar curve: $S = \frac{1}{2}\int_\alpha^\beta r^2 d\theta$

Infinite series formulas:

- Taylor series for $f(x)$ at a (McLauren series if $a = 0$): $T(x) = \sum_{n=0}^{\infty}\frac{f^{(n)(a)}}{n!}(x-a)^n$
- $\begin{cases} n\text{-th Taylor polynomial: } T_n(x) = \sum_{k=0}^{n}\frac{f^{(k)}(a)}{k!}(x-a)^k \\ n\text{-th Taylor remainder: } R_n(x) = T(x) - T_n(x) \\ \text{Taylor error formula: } |R_n(x)| \le \frac{|x-a|^{n+1}M}{(n+1)!} \text{ for } |x-a| \le d, \text{ if } |f^{(n+1)}(x)| \le M \text{ for } |x-a| \le d \end{cases}$
- Famous McLauren series: $\begin{cases} \frac{1}{1-x} = \sum_{n=0}^{\infty} x^n \\ e^x = \sum_{n=0}^{\infty}\frac{x^n}{n!} \\ \sin x = \sum_{n=0}^{\infty}\frac{(-1)^n x^{2n+1}}{(2n+1)!} \\ \cos x = \sum_{n=0}^{\infty}\frac{(-1)^n x^{2n}}{(2n)!} \end{cases} \qquad \begin{cases} \ln(1+x) = \sum_{n=0}^{\infty}\frac{(-1)^n x^{n+1}}{n+1} \\ \arctan x = \sum_{n=0}^{\infty}\frac{(-1)^n x^{2n+1}}{2n+1} \end{cases}$