

MATH 141 FINAL EXAM FORMULA SHEET

Useful trigonometric identities:

$$\begin{aligned}\cos^2 x + \sin^2 x &= 1 \\ \sin^2 x &= \frac{1 - \cos 2x}{2} \\ \cos^2 x &= \frac{1 + \cos 2x}{2}\end{aligned}$$

Integration by parts:

$$\int u \, dv = uv - \int v \, du.$$

One integral formula:

$$\int \frac{1}{x^2 + a} dx = \frac{1}{\sqrt{a}} \arctan\left(\frac{x}{\sqrt{a}}\right) + C \quad \text{if } a > 0.$$

Arc-length (parametric form):

$$L = \int_{t_0}^{t_1} \sqrt{\left(\frac{dx}{dt}\right)^2 + \left(\frac{dy}{dt}\right)^2} dt;$$

Area enclosed by a curve in polar coordinates:

$$A = \frac{1}{2} \int_{\theta_0}^{\theta_1} r^2 d\theta.$$

Geometric series:

$$\sum_{n=0}^{\infty} r^n = \frac{1}{1-r}, \quad \text{if } |r| < 1.$$

Important Maclaurin series:

$$\begin{aligned}e^x &= \sum_{n=0}^{\infty} \frac{x^n}{n!}; \\ \sin x &= \sum_{n=0}^{\infty} (-1)^n \frac{x^{2n+1}}{(2n+1)!}; \\ \cos x &= \sum_{n=0}^{\infty} (-1)^n \frac{x^{2n}}{(2n)!}; \\ \ln(1+x) &= \sum_{n=1}^{\infty} (-1)^{n+1} \frac{x^n}{n}\end{aligned}$$