

Math 1149 Final Exam Formulas

The following formulas will be provided with the final exam.

- $\sin^2(\theta) + \cos^2(\theta) = 1$ $\tan^2(\theta) + 1 = \sec^2(\theta)$ $\cot^2(\theta) + 1 = \csc^2(\theta)$
- $\sin(x + y) = \sin(x) \cos(y) + \cos(x) \sin(y)$
- $\cos(x + y) = \cos(x) \cos(y) - \sin(x) \sin(y)$
- $\tan(x + y) = \frac{\tan(x) + \tan(y)}{1 - \tan(x) \tan(y)}$
- $\sin(2x) = 2 \sin(x) \cos(x)$
- $\cos(2x) = \cos^2(x) - \sin^2(x) = 2 \cos^2(x) - 1 = 1 - 2 \sin^2(x)$
- $\tan(2x) = \frac{2 \tan(x)}{1 - \tan^2(x)}$
- $\sin\left(\frac{x}{2}\right) = \pm \sqrt{\frac{1 - \cos(x)}{2}}$
- $\cos\left(\frac{x}{2}\right) = \pm \sqrt{\frac{1 + \cos(x)}{2}}$
- $\tan\left(\frac{x}{2}\right) = \frac{1 - \cos(x)}{\sin(x)} = \frac{\sin(x)}{1 + \cos(x)}$
- Area of a triangle with sides of lengths a, b , and included angle θ : $\mathbf{A} = \frac{1}{2} \mathbf{ab} \sin(\theta)$
- $a + bi = r(\cos(\theta) + i \sin(\theta))$ where $r = \sqrt{a^2 + b^2}$ and $\tan(\theta) = \frac{b}{a}$
- Work \mathbf{W} of a force \mathbf{F} moving along a vector \mathbf{D} : $\mathbf{W} = \mathbf{F} \cdot \mathbf{D}$
- Parabola with focus $(0, p)$ and vertex $(0, 0)$:
$$x^2 = 4py ; \quad \text{Directrix: } y = -p$$
- Ellipse with foci $(\pm c, 0)$ and vertices $(\pm a, 0)$:
$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1, \quad (a > b > 0)$$

$$c^2 = a^2 - b^2 ; \quad \text{Eccentricity: } e = \frac{c}{a}$$
- Hyperbola with foci $(\pm c, 0)$ and vertices $(\pm a, 0)$:
$$\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1, \quad (a > 0, b > 0)$$

$$c^2 = a^2 + b^2 ; \quad \text{Asymptotes: } y = \pm \frac{b}{a} x$$