Math 1022—All Sections and Math 1023—All Sections
Formula Sheet for
Math 1022 Test 3, Math 1023 Tests 5 and 6, and
Math 1022 and Math 1023 Final Exams

Sum and Difference Formulas

$$\sin(\alpha+\beta)=\sin\alpha\cos\beta+\cos\alpha\sin\beta \qquad \tan(\alpha+\beta)=\frac{\tan\alpha+\tan\beta}{1-\tan\alpha\tan\beta}$$

$$\sin(\alpha-\beta)=\sin\alpha\cos\beta-\cos\alpha\sin\beta$$

$$\cos(\alpha+\beta)=\cos\alpha\cos\beta-\sin\alpha\sin\beta \qquad \tan(\alpha-\beta)=\frac{\tan\alpha-\tan\beta}{1+\tan\alpha\tan\beta}$$

$$\cos(\alpha-\beta)=\cos\alpha\cos\beta+\sin\alpha\sin\beta$$

Double-Angle Formulas

$$\sin 2\theta=2\sin\theta\cos\theta \qquad \cos 2\theta=\cos^2\theta-\sin^2\theta \qquad \tan 2\theta=\frac{2\tan\theta}{1-\tan^2\theta}$$

$$\cos 2\theta=1-2\sin^2\theta$$

$$\cos 2\theta=2\cos^2\theta-1$$

Half-Angle Formulas

$$\sin\left(\frac{\alpha}{2}\right)=\sqrt{\frac{1-\cos\alpha}{2}} \text{ or } -\sqrt{\frac{1-\cos\alpha}{2}}$$

$$\cos\left(\frac{\alpha}{2}\right)=\sqrt{\frac{1+\cos\alpha}{2}} \text{ or } -\sqrt{\frac{1+\cos\alpha}{2}}$$

$$\tan\left(\frac{\alpha}{2}\right)=\sqrt{\frac{1-\cos\alpha}{1+\cos\alpha}} \text{ or } -\sqrt{\frac{1-\cos\alpha}{1+\cos\alpha}}$$

$$\tan\left(\frac{\alpha}{2}\right)=\frac{1-\cos\alpha}{\sin\alpha}$$

$$\tan\left(\frac{\alpha}{2}\right)=\frac{\sin\alpha}{1+\cos\alpha}$$