

## Math Formula Sheet for AFM and Pre-Calculus

### Arithmetic Sequence and Series

$$a_n = a_1 + (n - 1)d$$

$$S_n = \frac{n}{2}(a_1 + a_n)$$

### Geometric Sequence and Series

$$a_n = a_1 \cdot r^{(n-1)}$$

$$S_n = \frac{a_1(1 - r^n)}{1 - r}, \text{ where } r \neq 1$$

$$S = \frac{a_1}{1 - r}, \text{ where } |r| < 1$$

### Law of Sines

$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

### Law of Cosines

$$a^2 = b^2 + c^2 - 2bc \cdot \cos A$$

$$b^2 = a^2 + c^2 - 2ac \cdot \cos B$$

$$c^2 = a^2 + b^2 - 2ab \cdot \cos C$$

### Conic Sections

#### Parabola

##### Focal Length

$$|a| = \frac{1}{4c}$$

#### Ellipse

##### Pythagorean Relationship

$$c^2 = a^2 - b^2$$

#### Hyperbola with Center $(h,k)$

##### Pythagorean Relationship

$$c^2 = a^2 + b^2$$

##### Foci

$$(h \pm c, k) \text{ or } (h, k \pm c)$$