PRE-CALCULUS FINAL EXAM FORMULA SHEET

Trigonometric Identities

Pythagorean

$$\sin^2\theta+\cos^2\theta=1$$
$$\tan^2\theta+1=\sec^2\theta$$
$$1+\cot^2\theta=\csc^2\theta$$

$$\tan(\theta)=\frac{sin\theta}{cos\theta} \qquad \cot(\theta)=\frac{cos\theta}{sin\theta}$$

$$sec\theta=\frac{1}{cos\theta} \qquad csc\theta=\frac{1}{sin\theta}$$

SOH CAH TOA (right triangles only)

Graphing Sine/Cosine

$$Period=\frac{2\pi}{B}\ or\ \frac{360}{B}$$

$$Phase\ Shift=-\frac{C}{B}$$

Quadratic Formula:

$$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$$

Complete the Square

$$\left(\frac{b}{2}\right)^2$$

Exponentials - Compound Interest

$$A=P\left(1+\frac{r}{n}\right)^{nt} \qquad A=Pe^{rt}$$

(Compounded) ***(Continuously)***

Exponentials (Basic Growth/Decay)

$$y=ab^t$$

where b = 100% + r% **or** 100%-r%

Circles

$$(x-h)^2+(y-k)^2=r^2$$

Ellipses

$$\frac{(x-h)^2}{a^2}+\frac{(y-k)^2}{b^2}=1$$

Hyperbolas

$$\frac{(x-h)^2}{a^2}-\frac{(y-k)^2}{b^2}=1$$
$$\frac{(y-k)^2}{a^2}-\frac{(x-h)^2}{b^2}=1$$

Parabolas with vertex (h, k)

$$x=a(y-k)^2+h$$
$$y=a(x-h)^2+k$$

Polar Coordinate Conversions

$$x=r\cos\theta \qquad x^2+y^2=r^2$$

$$y=r\sin\theta \qquad tan\theta=\frac{y}{x}$$

$$r=\sqrt{x^2+y^2}$$

Projectile Motion

$$x(t)=v_0\cos(\theta)t$$

$$y(t)=-\frac{1}{2}gt^2+v_o\sin(\theta)\,t+h$$

$$gravity=32\frac{ft}{sec^2}\ \ or\ \ 9.8\frac{m}{sec^2}$$

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Math Formula Sheet for Advanced Functions and Modeling, Discrete Mathematics, and Precalculus

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

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

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