Honors Precalculus B Formulas

Compound Interest Formulas:

Continuous compounding: $A(t) = Pe^{rt}$ compounded k times per year: $A(t) = P\left(1 + \frac{r}{k}\right)^{k\,t}$

Newton's Law of Cooling: $T(t) = T_m + (T_0 - T_m)e^{-kt}$

Parametric equations for projectile motion:
$$x = (v_0 \cos\theta)t$$
$$y = -16t^2 + (v_0 \sin\theta)t + h_0$$

Distance from the point (x_1, y_1) to the line $Ax + By + C = 0$: $\frac{|Ax_1 + By_1 + C|}{\sqrt{A^2 + B^2}}$

If $\vec{u} = \langle u_1, u_2 \rangle$ and $\vec{v} = \langle v_1, v_2 \rangle$, then $\vec{u} \bullet \vec{v} = u_1 v_1 + u_2 v_2$

If $\vec{u} = \langle u_1, u_2, u_3 \rangle$ and $\vec{v} = \langle v_1, v_2, v_3 \rangle$, then $\vec{u} \times \vec{v} = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ u_1 & u_2 & u_3 \\ v_1 & v_2 & v_3 \end{vmatrix}$

If $\vec{u} = \langle u_1, u_2 \rangle$, then

$|\vec{u}| = \sqrt{u_1^{\,2} + u_2^{\,2}}$ and the direction of $\vec{u} = \tan^{-1}\left(\frac{u_2}{u_1}\right)$, placed in the appropriate quadrant.

The angle between $\vec{u}$ and $\vec{v} = Cos^{-1}\left(\frac{\vec{u} \bullet \vec{v}}{|\vec{u}||\vec{v}|}\right)$

Law of Cosines: $c^2 = a^2 + b^2 - 2ab\cos C$

Law of Sines: $\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$

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Sum of an infinite geometric series:

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

Binomial Theorem:

$$(a+b)^n = \binom{n}{0}a^n + \binom{n}{1}a^{n-1}b + \binom{n}{2}a^{n-2}b^2 + \ldots + \binom{n}{r}a^{n-r}b^r + \ldots + \binom{n}{n}b^n$$

where $\binom{n}{r} = {}_nCr = \frac{n!}{r!(n-r)!}$

OR

$$(x+y)^n = x^n + nx^{n-1}y + \frac{n(n-1)}{1\cdot 2}x^{n-2}y^2 + \frac{n(n-1)(n-2)}{1\cdot 2\cdot 3}x^{n-3}y^3 + \ldots + y^n = \sum_{r=0}^{n}\frac{n!}{r!(n-r)!}x^{n-r}y^r$$