

MATH 112 FORMULA SHEET

Logarithms and Exponentials

The value A after t years of an investment of principal P paying interest at an annual rate r :

$$\text{with interest compounded } n \text{ times a year: } A = P(1 + r/n)^{nt}$$

$$\text{with interest compounded continuously: } A = Pe^{rt}$$

The population P after time t , with initial population P_0 and relative growth rate k :

$$P = P_0 e^{kt}$$

The mass M of a radioactive element after time t , with initial amount M_0 , and relative decay rate k :

$$M = M_0 e^{-kt}$$

Change of base formula:

$$\log_a x = \frac{\log_b x}{\log_b a}$$

Trigonometry:

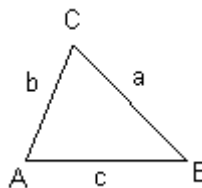
Notation: $\sin^2(\theta) = (\sin \theta)^2$

Arc Length: (θ in radians): $S = r\theta$ Area of a sector (θ in radians): $A_s = \frac{1}{2}r^2\theta$

Area of a triangle: $A_\Delta = \frac{1}{2}ab \sin C$

Law of Cosines: $a^2 = b^2 + c^2 - 2bc \cos A$

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



Addition and Subtraction Formulas:

$$\begin{aligned}\sin(a+b) &= \sin a \cos b + \cos a \sin b \\ \sin(a-b) &= \sin a \cos b - \cos a \sin b \\ \cos(a+b) &= \cos a \cos b - \sin a \sin b \\ \cos(a-b) &= \cos a \cos b + \sin a \sin b\end{aligned}$$

Double Angle Formulas:

$$\begin{aligned}\sin(2a) &= 2 \sin a \cos a \\ \cos(2a) &= \cos^2 a - \sin^2 a\end{aligned}$$

Half Angle Formulas:

$$\begin{aligned}\sin\left(\frac{a}{2}\right) &= \pm \sqrt{\frac{1 - \cos a}{2}} \\ \cos\left(\frac{a}{2}\right) &= \pm \sqrt{\frac{1 + \cos a}{2}}\end{aligned}$$