

Music 170 Formulas for test 2

Phase of a sinusoid: $\phi(t) = 2\pi ft + \phi_0$

Formula for a sinusoid: $x(t) = a \cos(2\pi ft + \phi_0)$

Frequency and period: $f = 1/\tau$

Pitch intervals in octaves (I) and half steps (H):

$$I = \log_2 \left(\frac{f}{f_{\text{ref}}} \right)$$

$$H = 12I$$

Levels (dB) from amplitude and power ratios:

$$L = 20 \cdot \log_{10} \left(\frac{a}{a_{\text{ref}}} \right) = 10 \cdot \log_{10} \left(\frac{P}{P_{\text{ref}}} \right)$$

Logarithms to any base b :

x	$1/b$	1	\sqrt{b}	b	b^2
$\log_b(x)$	-1	0	$1/2$	1	2

Logarithms to base 2:

x	1	2	3	4	5	10
$\log_2(x)$	0	1	1.585	2	2.322	3.322

Logarithms to base 10:

x	1	2	3	4	5	10
$\log_{10}(x)$	0	0.301	0.477	0.602	0.699	1

The just-intoned scale in C:

C	D	E	F	G	A	B	C
1	$9/8$	$5/4$	$4/3$	$3/2$	$5/3$	$15/8$	2