

# Cheatography

## Pre Calc Cheat Sheet

by bendystraw via cheatography.com/38297/cs/11944/

### Sequences

Arithmetic Sequence  $A_n = A_1 + D(n - 1)$

Geometric Sequence  $A_n = A_1(r^{n-1})$

Finite Sum  $S_n = A_1(1 - r^n) / 1 - r$

Infinite Sum ( $|r| < 1$ )  $A_1 / 1 - r$

### Volumes

Sphere  $V = (4/3)\pi r^2$   
 $A = 4\pi r^2$

Cone  $V = (1/3)\pi r^2 h$

Pyramid  $V = (1/3)bh$

Cylinder  $\pi r^2 h$

### Sin/Cos

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

Arc Length  $L = r\theta$

Double angle:  
 $\sin 2x = 2\cos x \sin x$   
 $\cos 2x = \cos^2 x - \sin^2 x$   
 $\cos 2x = 2\cos^2 x - 1$   
 $\cos 2x = 1 - 2\sin^2 x$   
 $\tan 2x = 2\tan x / 1 - \tan^2 x$

Half angle:  
 $\sin x/2 = \pm \sqrt{(1 - \cos x) / 2}$   
 $\cos x/2 = \pm \sqrt{(1 + \cos x) / 2}$   
 $\tan x/2 = \pm \sqrt{(1 - \cos x) / (1 + \cos x)}$   
 $\tan x/2 = (1 - \cos x) / \sin x$

### Vertical line test

If a vertical line intersects a supposed function at two different points, it is not a function.

### Probability

Combinations: Order doesn't matter  
 $8C5 = 8! / (8-5)!5!$

Permutations: Order matters  
 $8P5 = 8! / 5!$

Probability:  
 $P(A \text{ and } B) = P(A) * P(B)$   
 $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$   
If A and B are mutually exclusive:  
 $P(A \text{ or } B) = P(A) + P(B)$

### Coordinates

Point-slope form  $y - y_1 = m(x - x_1)$

Vertex of parabola:  $x = -b/2a$

### Parabola

Vertex  $(h, k)$

Focus  $(h, k +/- p)$

Directrix  $y = k - p$

### Ellipse

Center  $(h, k)$

Vertices  $(h, k +/- a)$

Foci  $(h, k +/- c)$

Major Axis  $2a$

Minor Axis  $2b$

### Hyperbola

Center  $(h, k)$

Vertices  $(h, k +/- a)$

Foci  $(h, k +/- c)$

Asymptotes  $y = k +/- (a/b)(x-h)$

### Sin/Cos/Tangent equations

$A\sin(Bx+C)+D$   
A = Amplitude  
B = Period  
C = Phase shift  
D = Vertical shift

$\sin$  or  $\cos(Bx)$  Period =  $2\pi/b$

$\tan(Bx)$  Period =  $\pi/b$

### Binomial Theorem

$$(a+b)^n = \sum_{k=0}^n \binom{n}{k} a^{n-k} b^k$$

### More binomial theorem

$$\binom{n}{k} = \frac{n!}{k!(n-k)!}$$



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