Quantitative Methods Midterm Cheat Sheet

by rockcollector2 via cheatography.com/22080/cs/4425/

Fraction Rules

Common Denominators

a/b + c/d = ad + bc/bd

Multiplication

a/b * c/d = ac/bd

Reciprocal

1/(a/b) = b/a

Theory of Geometric Series

$S = p + pr + pr^2 + pr^3 + ... + pr^n$

$Sr = p + pr + pr^2 + pr^3 + ... + pr^n + pr^{n+1}$

S - Sr = p - pr^n+1

$S = p\text{-}pr^{n+1}/1\text{-}r$

Lines

Given point (c,d) and slope m, the unique line that satisfies this is the set of all points (x,y) such that

m = y-d/x-c

slope is change in y/change in x

Parallel, Perpendicular

y=2x+4 and y=2x+3 are parallel

y=2x+4 and 2y=4x+8 are same line

y=2x+4 and y = 1/2x+6 meet perpendicularly

Parallel lines never meet, same slope

Perpendicular lines meet once at right angles and slopes are negative reciprocals

Geometric Formulas

SOHCAHTOA

SOH = sin(x) = a/c

CAH = cos(x) = b/c

TOA = tan(x) = a/b

180 degrees = (pi)rad

Divide arclength by radius to get radian measure

Special Angles

Degree Radian Cosine Sine Tangent

0 0 1 0 0

30 (pi)/6 sqrt3/2 1/2 1/sqrt3

45 (pi)/4 1/sqrt(2) 1/sqrt(2) 1

60 (pi)/3 1/2 sqrt(3)/2 sqrt(3)

90 (pi) 0 1 undefined

Quadratic Functions: Parabolas

$f(x) = ax^2 + bx + c$

Zeros given by the quadratic formula:

$-b +/- sqrt(b^2 - 4ac)/2a$

Coordinate point $(-b/2a, -b^2 +4ac)/4a)$

Geometric Equations

Circles: Circumference $2(pi)r$ Area $(pi)r^2$

Cylinders: Surface area $2(pi)r \times h + 2(pi)r^2$

Volume: $(pi)r^2h$

Sphere: Surface area $4(pi)r^2$ Volume $4/3(pi)r^3$

Negative Exponents

$a^{-m} = 1/a^m$

$1/a^{-m} = a^m$

Trigonometric Identities

$\cos^2 x + \sin^2 x = 1$

$\tan^{-1} x = \arctan x$

$\cot(x) = 1/\tan x$

$e^{10} = \cos x + i \sin x$

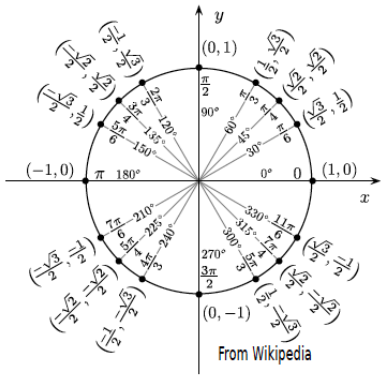
Secant, Cosecant, Cotangent

Secant: 1/cos(x)

Cosecant = 1/sin(x)

Cotangent = 1/tan(x) = cos(x)/sin(x)

Unit Circle



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Pythagorean Theorem

$a^2 + b^2 = c^2$

Exponential Rules

exp(a)exp(b) = exp(a+b)
[exp(a)]^b = exp(ab)
exp(-a) = 1/exp(a)
Domain: all real numbers
Range: all positive numbers

Absolute Values

Absolute Values often generate "and" and "-or" situations.
Examples:
|x|<1: -1<x and x<1 -1<x<1
|x|>1: x>1 or x<-1
|2x+3|> 1: 2x+3>1 or -(2x+3)>1
x>-1 or x<-2

Multiplication and Scientific Notation

Multiplication and Division:
- Convert into scientific notation
- Add/subtract exponents
- Multiply/divide coefficients
- Convert to scientific notation
- 2.3E4 x 9.5E7/1.6E10 = 2.3x9.5/1.6E(4+7-10)

Logarithms

Logarithms are the functional inverses of the exponential
y = b^x is equivalent to logb(y) = x
log(mn) = log(m) + log(n)
log(m^n) = nlog(m)
log(1/m) = -log(m)
loga(m) = logb(m)/logb(a)
exp(a)exp(b) = exp(ab)
exp(-a) = 1/exp(a)
$e^{2.3 = 10, e}12 = e^{2.3*5.2 = (e}2.3)^{5.2 = 10}5.2 =$ 2E5

Function Variables

Domain = valid inputs to function
Range = what can the function produce
Zeros or Roots = where is f(x)=0
Intersections = Where is f(x) = g(x)
Local maximum is largest value around itself
Local minimum is smallest value around itself
Global is largest overall

Sine

Sine is the y component as theta spins
Domain is all real numbers
Range -1</ y </ 1
Maxima at pi/2 + 2kpi, Minima at 3pi/2 + 2kpi
Zeros at kpi
Period 2pi

Cosine

Cosine is the x component as theta spins
Domain is all real numbers
Range is -1</ y </ 1
Max is 2kpi, Minima (2k + 1)pi
Zeros at pi/2 + kpi
Period is 2pi

Tangent

Tangent is the slope of the line with angle theta
Domain is all real numbers except pi/2 + kpi
Range is all real numbers
No max or min. asymptotes at undefined points
Zeros at kpi
Period is pi

Distance Between Points

The distance between two points on the plane is based on the Pythagorean Theorem
$|A-B| = \text{sqrt}((Xa-Xb)^2 + (Ya - Yb)^2)$
A=(Xa,Ya) B=(Xb,Yb)

Basic Facts

Total human population: 7 billion
USA population: 300 million
Distance from NY to LA: 2500 miles
Distance to the moon: 2.4E5 miles
Distance to the Sun: 1E8 miles
Distance around the equator: 2.5E4 miles
Area of the US: 4E6 square miles
Surface area of the Earth: 2E8 square miles

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