Build-your-own formula sheet.

Algebraic

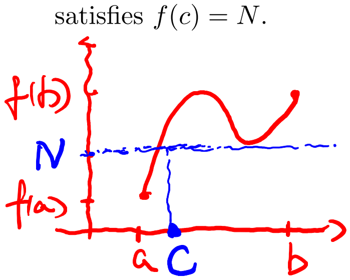
- $a^2 - b^2 = (a-b)(a+b)$, $(\sqrt{A}-\sqrt{B})(\sqrt{A}+\sqrt{B}) = A-B$
- $a^3 - b^3 = (a-b)(a^2+ab+b^2)$
- Quadratic Formula: $\dfrac{-b \pm \sqrt{b^2-4ac}}{2a}$

Geometric

- Area of Circle: πr^2
- Circumference of Circle: $2\pi r$
- Circle with center (h,k) and radius r:
$$(x-h)^2 + (y-k)^2 = r^2$$
- Distance from (x_1, y_1) to (x_2, y_2):
$$\sqrt{(x_1-x_2)^2 + (y_1-y_2)^2}$$
- Area of Triangle: $\frac{1}{2}bh$
- $\sin\theta = \dfrac{\text{opposite leg}}{\text{hypotenuse}}$
- $\cos\theta = \dfrac{\text{adjacent leg}}{\text{hypotenuse}}$
- $\tan\theta = \dfrac{\text{opposite leg}}{\text{adjacent leg}}$
- If $\triangle ABC$ is similar to $\triangle DEF$ then
$$\frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF}$$
- Volume of Sphere: $\frac{4}{3}\pi r^3$
- Surface Area of Sphere: $4\pi r^2$
- Volume of Cylinder/Prism: (height)(area of base)
- Volume of Cone/Pyramid: $\frac{1}{3}$(height)(area of base)

Theorems

- (IVT) If f is continuous on $[a,b]$, $f(a) \neq f(b)$, and N is between $f(a)$ and $f(b)$ then there exists $c \in (a,b)$ that satisfies $f(c) = N$.



$f(c) = N$

- (Squeeze Thm) Suppose $f(x) \le g(x) \le h(x)$ and $\lim\limits_{x\to a} f(x) = \lim\limits_{x\to a} h(x) = L$ Then $\lim\limits_{x\to a} g(x) = L$.

Limits

- $\lim\limits_{x\to a} f(x)$ exists if and only if $\lim\limits_{x\to a^-} f(x) = \lim\limits_{x\to a^+} f(x)$
- $\lim\limits_{\theta\to 0} \dfrac{\sin\theta}{\theta} = 1$
- $\lim\limits_{\theta\to 0} \dfrac{1-\cos\theta}{\theta} = 0$

Derivatives

- $f'(x) = \lim\limits_{h\to 0} \dfrac{f(x+h)-f(x)}{h}$
- $(\cot x)' = -\csc^2 x$
- $(\csc x)' = -\csc x \cdot \cot x$

Trigonometric

- $\sin^2\theta + \cos^2\theta = 1$
- $\sin(2\theta) = 2\sin\theta\cos\theta$
- $\cos(2\theta) = \cos^2\theta - \sin^2\theta = 1 - 2\sin^2\theta = 2\cos^2\theta - 1$
- Table of Trig Values

x	0	$\pi/6$	$\pi/4$	$\pi/3$	$\pi/2$
$\sin(x)$	0	$1/2$	$\sqrt{2}/2$	$\sqrt{3}/2$	1
$\cos(x)$	1	$\sqrt{3}/2$	$\sqrt{2}/2$	$1/2$	0
$\tan(x)$	0	$\sqrt{3}/3$	1	$\sqrt{3}$	~~DNE~~ $\pm\infty$

More derivatives:

$(\text{const})' = 0$, $(kx+b)' = k$

$(x^n)' = n \cdot x^{n-1}$

$(f \pm g)' = f' \pm g'$, $(c \cdot f)' = c \cdot f'$

$\left(\dfrac{f}{c}\right)' = \dfrac{f'}{c}$

$(f \cdot g)' = f' \cdot g + f \cdot g'$

$\left(\dfrac{f}{g}\right)' = \dfrac{f' \cdot g - f \cdot g'}{g^2}$

- $(\sin x)' = \cos x$, $(\cos x)' = -\sin x$

  $(\tan x)' = \sec^2 x$, $(\sec x)' = \tan x \cdot \sec x$

- $[f(g(x))]' = f'(g(x)) \cdot g'(x)$

- tangent line equation at $x = a$

  $y = f'(a) \cdot (x - a) + f(a)$

- $|\blacksquare| = \begin{cases} \blacksquare, & \blacksquare \geq 0 \\ -\blacksquare, & \blacksquare < 0 \end{cases}$

  $\frac{1}{\blacksquare} = \blacksquare^{-1}$, $\sqrt{\blacksquare} = \blacksquare^{\frac{1}{2}}$