$$\lim_{x\to 0}\frac{\sin x}{x}=$$

1.1 (Front)

$$\lim_{x\to\infty}\frac{\sin x}{x}$$

1.2 (Front)

$$\lim_{x\to 0}\frac{\sin^2 x}{x}$$

1.3 (Front)

$$\lim_{x\to 0}\frac{\cos x-1}{x}$$

1.4 (Front)

$$\lim_{x\to 0}\frac{\sin(ax)}{(bx)}=\lim_{x\to 0}\frac{\sin(ax)}{\sin(bx)}=\lim_{x\to 0}\frac{(bx)}{\sin(ax)}$$

1.5 (Front)

$\lim_{x\to a} f(x)=L\ (\text{exists})$ If

and only if

1.6 (Front)

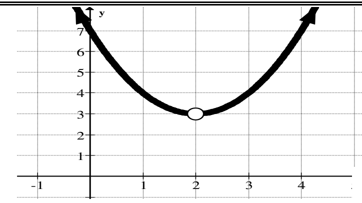
$f(x)$ is cont a if

1.7 (Front)

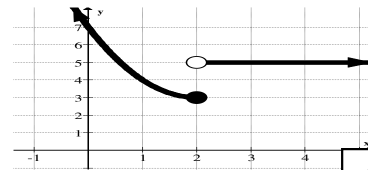
Continuity at a

if = =

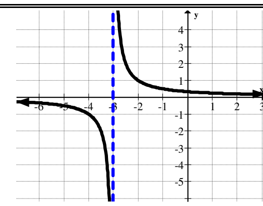
1.8 (Front)



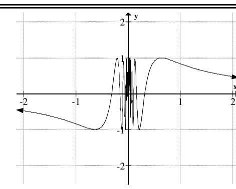
1.9 (Front)



1.10 (Front)



1.11 (Front)



1.12 (Front)

$$\frac{d}{dx}c=$$

2.1 (Front)

$$\frac{d}{dx}c[f(x)]=$$

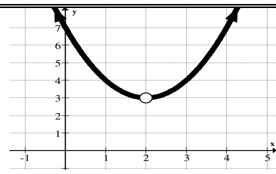
2.2 (Front)

$$\frac{d}{dx}x^n=$$

2.3 (Front)

$$\frac{d}{dx}(u\pm v)=$$

2.4 (Front)

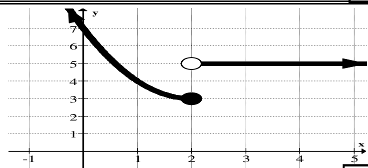


Removable discontinuity

1.9 (Back)

$$\lim_{x \to 0} \frac{\sin x}{x} = 1$$

1.1 (Back)

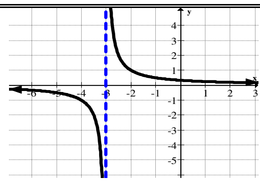


Jump discontinuity

1.10 (Back)

$$\lim_{x \to \infty} \frac{\sin x}{x} = 0$$

1.2 (Back)

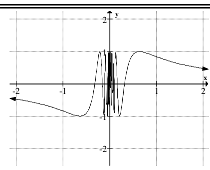


Infinite Discontinuity

1.11 (Back)

$$\lim_{x \to 0} \frac{\sin^2 x}{x} = 0$$

1.3 (Back)



Oscillating Discontinuity

1.12 (Back)

$$\lim_{x \to 0} \frac{\cos x - 1}{x} = 0$$

1.4 (Back)

$$\frac{d}{dx} c = 0 \text{ (Constant)}$$

2.1 (Back)

$$\lim_{x \to 0} \frac{\sin(ax)}{(bx)} = \lim_{x \to 0} \frac{\sin(ax)}{\sin(bx)}$$

$$= \lim_{x \to 0} \frac{(bx)}{\sin(ax)} = \frac{a}{b}$$

1.5 (Back)

$$\frac{d}{dx} c[f(x)] = c \frac{d}{dx} f(x) \begin{pmatrix} \text{constant} \\ \text{multiple} \end{pmatrix}$$

2.2 (Back)

$\lim_{x \to a} f(x) = L$ (exists) If

and only if

$\lim_{x \to a^+} f(x) = \lim_{x \to a^-} f(x) = L$

1.6 (Back)

$$\frac{d}{dx} x^n = nx^{n-1} \text{ (power)}$$

2.3 (Back)

$f(x)$ is cont a if

$$\lim_{x \to a} f(x) = f(a)$$

1.7 (Back)

$$\frac{d}{dx}(u \pm v) = \frac{d}{dx} u \pm \frac{d}{dx} v \begin{pmatrix} \text{Sum \&} \\ \text{Difference} \end{pmatrix}$$

2.4 (Back)

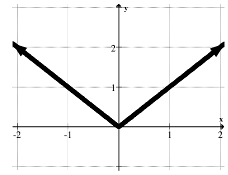
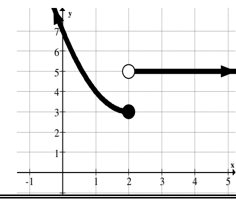
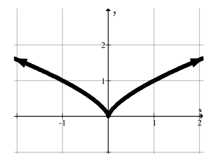
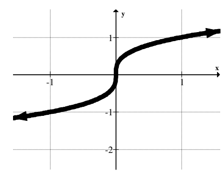
Continuity at a

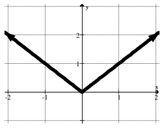
if $\lim_{x \to a^-} f(x) = f(a) = \lim_{x \to a^+} f(x)$

1.8 (Back)

$\frac{d}{dx}(uv) =$ 2.5 (Front)	$\frac{d}{dx}\sqrt{u} =$ 2.24 (Front)
$\frac{d}{dx}\left(\frac{u}{v}\right) =$ 2.6 (Front)	$\frac{d}{dx}\lvert u \rvert =$ 2.25 (Front)
$\left(f^{-1}\right)'(x) =$ 2.7 (Front)	$\frac{d}{dx}\sin u =$ 1.3(a) 2.8 (Front)
$\frac{d}{dx} f\left(g\left(x\right)\right) =$ Oscillating Discontinuity 2.8 (Front)	$\frac{d}{dx}\cos u =$ 2.9 (Front)
$\frac{d}{dx}\ln u =$ 2.20 (Front)	$\frac{d}{dx}\tan u =$ 2.10 (Front)
$\frac{d}{dx}\log_a u =$ 2.21 (Front)	$\frac{d}{dx}\cot u =$ 2.11 (Front)
$\frac{d}{dx}e^u =$ 2.22 (Front)	$\frac{d}{dx}\sec u =$ 2.12 (Front)
$\frac{d}{dx}a^u =$ 2.23 (Front)	$\frac{d}{dx}\csc u =$ 2.13 (Front)

$\dfrac{d}{dx}\sqrt{u}=\dfrac{1}{2\sqrt{u}}\dfrac{du}{dx}$ 2.24 (Back)	$\dfrac{d}{dx}(uv)=v\dfrac{d}{dx}u+u\dfrac{d}{dx}v\,(\text{Product})$ 1.1(a) 2.5 (Back)
$\dfrac{d}{dx}\lvert u\rvert=\dfrac{u}{\lvert u\rvert}\dfrac{du}{dx}$ 2.25 (Back)	$\dfrac{d}{dx}\left(\dfrac{u}{v}\right)=\dfrac{v\dfrac{d}{dx}u-u\dfrac{d}{dx}v}{v^2}(\text{Quotient})$ 2.6 (Back)
$\dfrac{d}{dx}\sin u=\cos u\dfrac{du}{dx}$ 2.8 (Back)	$\left(f^{-1}\right)'(x)=\dfrac{1}{f'\left(f^{-1}(x)\right)}(\text{Inverse})$ 1.3(a) 2.7 (Back)
$\dfrac{d}{dx}\cos u=-\sin u\dfrac{du}{dx}$ 2.9 (Back)	$\dfrac{d}{dx}f\left(g(x)\right)=\dfrac{d}{dx}f(u)\bullet\dfrac{d}{dx}g(x)$ where $u=g(x)$ (Quotient) 2.8 (Back)
$\dfrac{d}{dx}\tan u=\sec^2 u\dfrac{du}{dx}$ 2.10 (Back)	$\dfrac{d}{dx}\ln u=\dfrac{1}{u}\dfrac{du}{dx}$ 2.20 (Back)
$\dfrac{d}{dx}\cot u=-\csc^2 u\dfrac{du}{dx}$ 2.11 (Back)	$\dfrac{d}{dx}\log_a u=\dfrac{1}{u\ln a}\dfrac{du}{dx}$ 2.21 (Back)
$\dfrac{d}{dx}\sec u=\sec u\tan u\dfrac{du}{dx}$ 2.12 (Back)	$\dfrac{d}{dx}e^u=e^u\dfrac{du}{dx}$ 2.22 (Back)
$\dfrac{d}{dx}\csc u=-\csc u\cot u\dfrac{du}{dx}$ 2.13 (Back)	$\dfrac{d}{dx}a^u=a^u\ln a\dfrac{du}{dx}$ 2.23 (Back)

$\frac{d}{dx}\sin^{-1}u =$ 2.14 (Front)	 2.26 (Front)
$\frac{d}{dx}\cos^{-1}u =$ 2.15 (Front)	 2.27 (Front)
$\frac{d}{dx}\tan^{-1}u =$ 2.16 (Front)	 2.28 (Front)
$\frac{d}{dx}\cot^{-1}u =$ 2.17 (Front)	 2.29 (Front)
$\frac{d}{dx}\sec^{-1}u =$ 2.18 (Front)	$\int x^n dx =$ 3.1 (Front)
$\frac{d}{dx}\csc^{-1}u =$ 2.19 (Front)	$\int \frac{1}{x} dx =$ 3.2 (Front)
Mean Value Theorem: 2.30 (Front)	$\int \frac{1}{ax+b} dx$ 3.3 (Front)
Rolle's Theorem: 2.31 (Front)	$\int e^{kx} dx =$ 3.4 (Front)

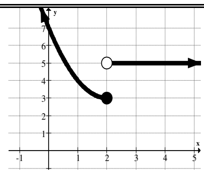


Corner f is not differentiable there

2.26 (Back)

$$\frac{d}{dx}\sin^{-1}u=\frac{1}{\sqrt{1-u^2}}\frac{du}{dx}$$

2.14 (Back)

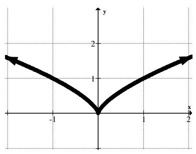


Discontinuity f is not Differentiable here

2.27 (Back)

$$\frac{d}{dx}\cos^{-1}u=\frac{-1}{\sqrt{1-u^2}}\frac{du}{dx}$$

2.15 (Back)

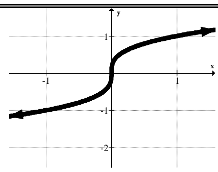


Cusp: f is not differentiable here

2.28 (Back)

$$\frac{d}{dx}\tan^{-1}u=\frac{1}{1+u^2}\frac{du}{dx}$$

2.16 (Back)



Vertical Tangent: f is not differentiable here

2.29 (Back)

$$\frac{d}{dx}\cot^{-1}u=\frac{-1}{1+u^2}\frac{du}{dx}$$

2.17 (Back)

$$\int x^n dx=\frac{x^{n+1}}{n+1}+C$$

3.1 (Back)

$$\frac{d}{dx}\sec^{-1}u=\frac{1}{|u|\sqrt{u^2-1}}\frac{du}{dx}$$

2.18 (Back)

$$\int \frac{1}{x}dx=\ln|x|+C$$

3.2 (Back)

$$\frac{d}{dx}\csc^{-1}u=\frac{-1}{|u|\sqrt{u^2-1}}\frac{du}{dx}$$

2.19 (Back)

$$\int \frac{1}{ax+b}dx=\frac{\ln|ax+b|}{a}+C$$

3.3 (Back)

Mean Value Theorem: If f is cont on $[a,b]$ on and diff on $(a,b) \Rightarrow$ exist a $c\in(a,b)$ s.t. $f'(c)=\frac{f(b)-f(a)}{b-a}$

2.30 (Back)

$$\int e^{kx}dx=\frac{e^{kx}}{k}+C$$

3.4 (Back)

Rolle's Theorem: MVT where $f'(c)=\frac{f(b)-f(a)}{b-a}=0$

2.31 (Back)

$\int a^x dx =$ 3.5 (Front)	2.34 (Front) Limit Definition of the derivative $f'(a) =$
$\int \sin kx \, dx =$ 3.6 (Front)	$f'(x) \approx$ = = 2.35 (Front)
$\int \cos kx \, dx =$ 3.7 (Front)	3.11 (Front) $\mathbf{LRAM}_n$
$\int \sec x \tan x dx =$ 3.8 (Front)	$\mathbf{RRAM}_n$ 3.12 (Front)
$\int \sec^2 x dx =$ 3.9 (Front)	3.13 (Front) $\mathbf{MRAM}_n$
$\int \csc x \cot x \, dx =$ 3.10 (Front)	3.14 (Front) Trapezoid Rule with n rectangles
Intermediate Value Theorem (IVT): 2.32 (Front)	**Average Value of f on (a,b)** 3.15 (Front)
Limit Definition of the derivative $f'(x) =$ 2.33 (Front)	FTC I: or 3.16 (Front)

2.34 (Back) $f'(a)=\lim_{x\to a}\frac{f(x)-f(a)}{x-a}$	$\int a^x\,dx=\frac{a^u}{\ln a}+C$ 1.1(a) 3.5 (Back)
$f'(x)\approx$ **Average rate of change** **= Slope of Secant line** $=\frac{f(b)-f(a)}{b-a}$ 2.35 (Back)	$\int \sin kx\,dx=-\frac{\cos kx}{k}+C$ 3.6 (Back)
3.11 (Back) **LRAM**$_n$ **=** $w\left(f(x_1)+f(x_2)+..+f(x_{n-1})\right)$ **or** $w_1f(x_1)+w_2f(x_2)+..+w_{n-1}f(x_{n-1})$	$\int \cos kx\,dx=\frac{\sin kx}{k}+C$ 3.7 (Back)
RRAM$_n$ **=** $w\left(f(x_2)+f(x_3)+\cdots+f(x_n)\right)$ **or** $w_1f(x_2)+w_2f(x_2)+..+w_{n-1}f(x_n)$ 3.12 (Back)	$\int \sec x\tan x\,dx=\sec x+C$ 3.8 (Back)
MRAM$_n$ **=** 3.13 (Back) $w\left(f\left(\frac{x_1+x_2}{2}\right)+f\left(\frac{x_2+x_3}{2}\right)+\cdots+f\left(\frac{x_{n-1}+x_n}{2}\right)\right)$ *or* $w_1f\left(\frac{x_1+x_2}{2}\right)+w_2f\left(\frac{x_2+x_3}{2}\right)+\cdots+w_{n-1}f\left(\frac{x_{n-1}+x_n}{2}\right)$	$\int \sec^2 x\,dx=\tan x+C$ 3.9 (Back)
T$_n$ **=** 3.14 (Back) $\frac{w}{2}\left(y_1+2y_2+\cdots+2y_{n-1}+y_n\right)$ **or** $\frac{1}{2}\left(w_1(y_1+y_2)+w_2(y_2+y_3)+...\right)$	$\int \csc x\cot x\,dx=-\csc x+C$ 3.10 (Back)
Average Value of f on (a,b) $\text{av}(f)=f_{ave}=\frac{1}{b-a}\int_a^b f(x)\,dx$ 3.15 (Back)	Intermediate Value Theorem. If f is cont on $[a,b]$ and $d\in[f(a),f(b)]$ then there is a $c\in[a,b]$ st $f(c)=d$ 2.32 (Back)
FTC I: $\int_a^b f(x)\,dx=F(b)-F(a)$ or $\int_a^b f'(x)\,dx=f(b)-f(a)$ 3.16 (Back)	Limit Definition of the derivative $f'(x)=\lim_{h\to 0}\frac{f(x+h)-f(x)}{h}$ 2.33 (Back)

FTC II:

3.17 (Front)

Displacement:

4.6 (Front)

Integration by Parts

Use ________ to select *u*

3.18 (Front)

Distance

4.7 (Front)

Integration by substitution

3.19 (Front)

Velocity:

4.8 (Front)

Derivative of f at *a*:

4.1 (Front)

Speed

4.9 (Front)

Critical Number *c*

4.2 (Front)

Acceleration

4.10 (Front)

First Derivative Test

4.3 (Front)

11. Given initial position $s(a) = C$ the final position is given by

4.11 (Front)

Concavity Test

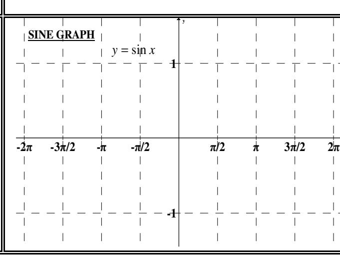
4.4 (Front)

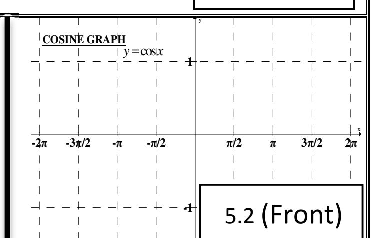
Reciprocal		**Quotient**	**Pythagorean**
			$= 1$
$\sin x =$	$\csc x =$	$\tan x =$	$\tan^2 x + 1 =$
$\cos x =$	$\sec x =$	$\cot x =$	$\cot^2 x + 1 =$
$\tan x =$	$\cot x =$		

5.1 (Front)

Point of Inflection at c

4.5 (Front)





5.2 (Front)

Displacement: A Vector quantity that represents the net change in position

$$s(t)=x(b)-x(a)=\int_a^b v(t)$$

4.6 (Back)

FTC II: $i)\ \int_a^x f(t)\,dt = F(x)$ $\quad ii)\ \frac{d}{dx}\int_a^x f(t)\,dt = f(x)$

$$iii)\ \frac{d}{dx}\int_{h(x)}^{g(x)} f(t)\,dt = f(g(x))\cdot g'(x) - h(g(x))\cdot h'(x)$$

3.17 (Back)

Distance: A scalar quantity that represents total movement regardless of sign

$$d(t)=|x(b)-x(a)|=\int_a^b |v(t)|\,dt$$

4.7 (Back)

Integration by parts:

$$\int vdu = uv - \int vdu$$

3.18 (Back)

Velocity: A Vector quantity that represents the rate of change of position

$$v(t)=s'(t)$$

4.8 (Back)

$$\int f(g(x))\,g'(x) = \int f(u)\,du$$

3.19 (Back)

Speed: A scalar quantity that represents the rate of covering distance

Speed $=|v(t)|$

4.9 (Back)

The instantaneous rate of change of the function at *a* or the slope of the tangent line at *a*

$$f'(a)=\left.\frac{df}{dx}\right|_{x=a} = \lim_{h\to 0}\frac{f(a+h)-f(a)}{h}$$

4.1 (Back)

Acceleration: A vector quantity that represents the rate of change of velocity

$$a(t)=v'(t)=s''(t)$$

4.10 (Back)

A number *c* in an open (*a*,*b*) interval where the derivative is zero or does not exist

$c\in(a,b)$ where

$f'(c)=0$ or $f'(c)$ DNE

4.2 (Back)

Given initial position $s(a)=C$ the final position is given by $s(b)=s(a)+\int_a^b s'(t)\,dt$

4.11 (Back)

a) If the first derivative changes from negative to positive at c then the function has a relative minimum at c

b) If the first derivative changes from positive to negative at c then the function has a relative maximum at c

4.3 (Back)

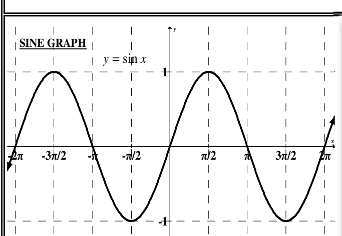
Reciprocal		**Quotient**	**Pythagorean**
$\sin x=\frac{1}{\csc x}$	$\csc x=\frac{1}{\sin x}$	$\tan x=\frac{\sin x}{\cos x}$	$\sin^2 x+\cos^2 x=1$
$\cos x=\frac{1}{\sec x}$	$\sec x=\frac{1}{\cos x}$	$\cot x=\frac{\cos x}{\sin x}$	$\tan^2 x+1=\sec^2 x$
$\tan x=\frac{1}{\cot x}$	$\cot x=\frac{1}{\tan x}$		$\cot^2 x+1=\csc^2 x$

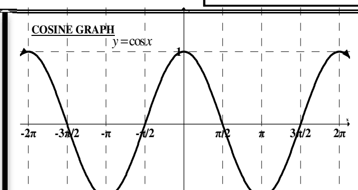
5.1 (Back)

a) If the second derivative is positive on an interval I then the function is Concave Up on I

b) If the second derivative is negative on an interval I the function is Concave down on *I*

4.4 (Back)





5.2 (Back)

f: Is a point where the concavity of f changes

f': Is a point where *f'* changes from increasing to decreasing or decreasing to increasing

f'': Is a point where *f''* changes from positive to negative or negative to positive

4.5 (Back)