```
type reimsum
```

```
function T =reimsum(fun,a,b,n)
format compact
N = length(n);

%Riemann sum calculations
for j = 1:N
    h(j) = (b-a)/n(j);

% initialize sums to zero
Il = 0;
Ir = 0;
Im = 0;
    for i = 1:n(j)
        xl = a + h(j)*(i-1);
        xr = a + h(j)*(i);
        xm = a + h(j)*(2*i-1)/2;

        Il = Il + fun(xl)*h(j);
        Ir = Ir + fun(xr)*h(j);
        Im = Im + fun(xm)*h(j);
    end
% populates vectors L,M and R with Riemann sums
L(j,1) = Il;
M(j,1) = Im;
R(j,1) = Ir;
end

A = [n,L,M,R];
%Converts the N-by-4 array A into an N-by-4 table T with the names
% of the variables
T = array2table(A,'VariableNames',{'n','Left','Middle','Right'});

end
```

```
syms x
format long

%(a)
fun=@(x) x.*tan(x) + x + 1
```

```
fun = function_handle with value:

    @(x)x.*tan(x)+x+1
```

```
a=0;b=1;
n=(1:10)';
T = reimsum(fun,a,b,n)
```

T = 10×4 table

	n	Left	Middle	Right
1	1	1.00000...	1.773151...	3.55740...
2	2	1.38657...	1.881266...	2.66527...
3	3	1.54665...	1.906168...	2.39912...
4	4	1.63392...	1.915497...	2.27327...
5	5	1.68877...	1.919945...	2.20025...

	n	Left	Middle	Right
6	6	1.72641...	1.922400...	2.15264...
7	7	1.75384...	1.923894...	2.11918...
8	8	1.77470...	1.924869...	2.09438...
9	9	1.79111...	1.925541...	2.07527...
10	10	1.80435...	1.926022...	2.06009...

```
%The middle points on the subinterval partition seem to be the best
%as they are closer to the approximation which is 1.928...
n=[1;5;10;100;1000;10000];
T=reimsum(fun,a,b,n)
```

T = 6×4 table

	n	Left	Middle	Right
1	1	1.00000...	1.773151...	3.55740...
2	5	1.68877...	1.919945...	2.20025...
3	10	1.80435...	1.926022...	2.06009...
4	100	1.91534...	1.928067...	1.94091...
5	1000	1.92681...	1.928088...	1.92936...
6	10000	1.92796...	1.928088...	1.92821...

```
Int=integral(fun,a,b)
```

```
Int =
   1.928088301365176
```

```
%(b)
fun=@(x) x.^4 - 2*x - 2
```

```
fun = function_handle with value:

    @(x)x.^4-2*x-2
```

```
a=0;b=3;
n=(1:10)';
T=reimsum(fun,a,b,n)
```

T = 10×4 table

	n	Left	Middle	Right
1	1	-6.0000...	0.187500...	219
2	2	-2.9062...	23.91796...	1.09593750...
3	3	5.00000...	29.18750...	80
4	4	10.5058...	31.09643...	66.7558...
5	5	14.3270...	31.99133...	59.3270...
6	6	17.0937...	32.48046...	54.5937...

	n	Left	Middle	Right
7	7	19.1782...	32.77642...	51.3211...
8	8	20.8011...	32.96891...	48.9261...
9	9	22.0987...	33.10108...	47.0987...
10	10	23.1591...	33.19570...	45.6591...

```
%The middle points on the subinterval partition seem to be the best
%as they are closer to the approximation which is 33.600...
n=[1;5;10;100;1000;10000];
T=reimsum(fun,a,b,n)
```

T = 6×4 table

	n	Left	Middle	Right
1	1	-6.0000...	0.187500...	219
2	5	14.3270...	31.99133...	59.3270...
3	10	23.1591...	33.19570...	45.6591...
4	100	32.4830...	33.59595...	34.7330...
5	1000	33.4875...	33.59995...	33.7125...
6	10000	33.5887...	33.59999...	33.6112...

```
Int=integral(fun,a,b)
```

```
Int =
  33.600000000000001
```