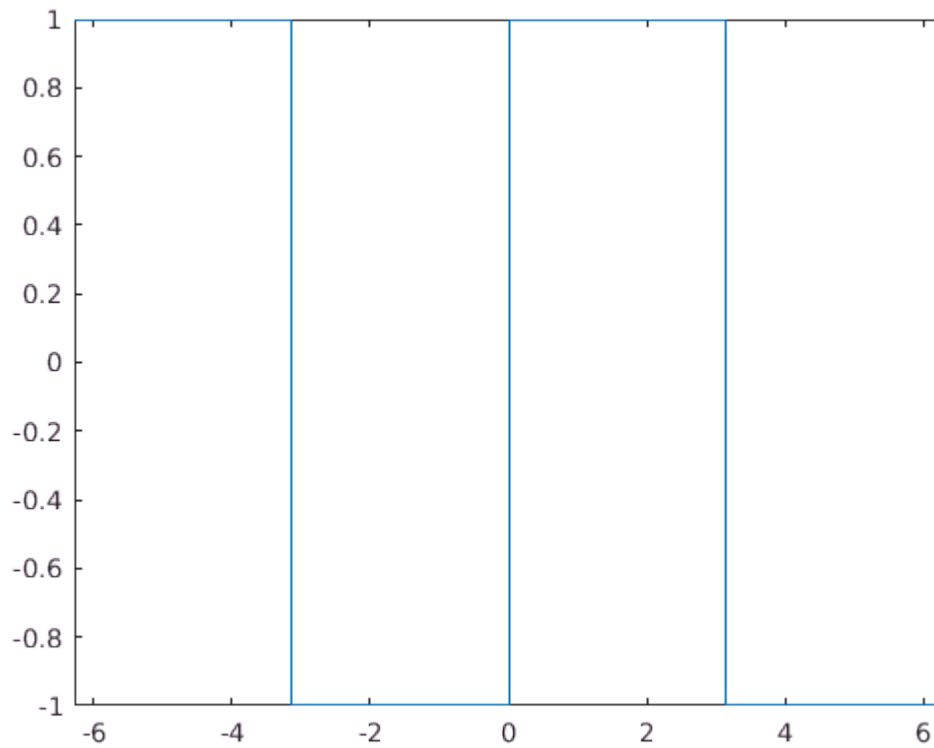```
terms=[5 10 20 40 80 160 320 640];
syms x;
f=(-1)^floor(x/pi);
fplot(f,[-2*pi,2*pi])
```



```
syms n;
L=2*pi;
coeff=int(f*exp(-1i*n*2*pi*x/L),x,-L/2,L/2)/L
```

coeff =

$$-\frac{e^{-\pi n i}\left(e^{\pi n i} i - i\right)^2 i}{2 n \pi}$$

```
transform=coeff*exp(1i*2*pi*n*x/L)
```

transform =

$$-\frac{e^{-\pi n i} e^{n x i}\left(e^{\pi n i} i - i\right)^2 i}{2 n \pi}$$

```
ranges=[];
for i=terms
    tmp=[];
    parfor j=-floor(i/2):floor(i/2)
        if j==0
            continue
        end
```
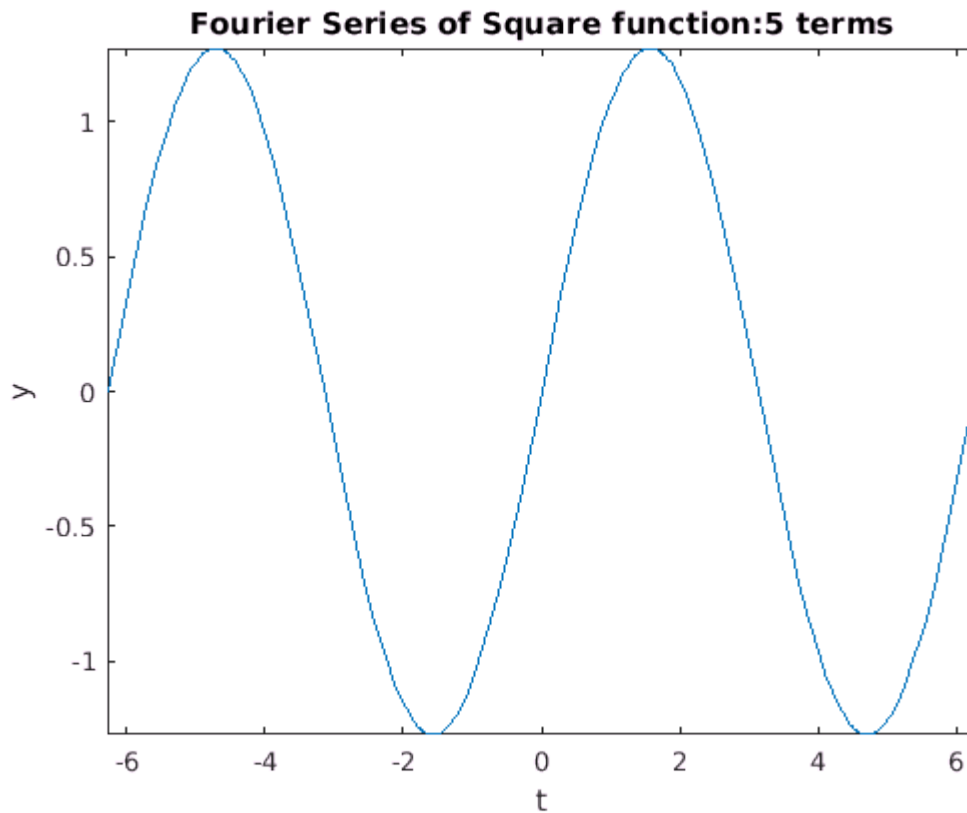
```
            tmp=[tmp subs(transform,n,j)];
        end
        ranges=[ranges sum(tmp)];
    end
end
```

```
fig=figure;
```

Fourier Series of Square function:5 terms


```
filename='animation_series.gif';
for i=1:length(ranges)
    fplot(real(ranges(i)),[-2*pi,2*pi]);
    title(strcat('Fourier Series of Square function:',string(terms(i)),' terms'));
    xlabel('t');
    ylabel('y');
    drawnow;
    frame=getframe(fig);
    im=frame2im(frame);
    [imidx,cm]=rgb2ind(im,256);
    if i==1
        imwrite(imidx,cm,filename,'gif','Loopcount',inf);
    else
        imwrite(imidx,cm,filename,'gif','WriteMode','append');
    end
end
```

Fourier Series of Square function:640 terms