

### Periodic Functions

We say  $f(x)$  is periodic with period  $m$  if  $f(x)=f(x+m)$  for all  $x$ .  
Usually we are given a formula for  $f$  on a single period  $[a,b)$  with  $b-a=m$ .  
To find  $f(x)$  for  $x$  not in  $[a,b)$  we first find the greatest integer multiple  
of  $m$  less than or equal to  $x-a$ ,

$$z=m*\text{floor}((x-a)/m)$$

(Here  $\text{floor}(t)$  is the MATLAB function giving the greatest integer  $\leq t$ .)  
Now  $y=x-z$  is in  $[a,b)$ . The point is that  $f(y)=f(x)$  and we have a formula  
for  $f(y)$ .

#### example

Let  $f(x)=\text{abs}(x)$  for  $-3 \leq x < 3$  and assume  $f(x)$  is  $3-(-3)=6$ -periodic.  
To write a M-file for  $f$  type :

```
*****  
function w=f(x)  
z=6*floor((x+3)/6);  
y=x-z;  
w=abs(y);  
*****
```

#### ASSIGNMENT 3 :

1. Let  
 $f(x)=x^2$  if  $-2 \leq x < 2$   
and  $f(x)$  is 4-periodic.  
Write  $f.m$  and graph  $f(x)$  on  $[-10,10]$ .

2. Let  
 $g(x)=x$  if  $-2 \leq x < 2$   
and  $g(x)$  is 4-periodic .  
Write  $g.m$  and graph  $g(x)$  on  $[-10,10]$  .