Rectifier Tables

Diego Trapero

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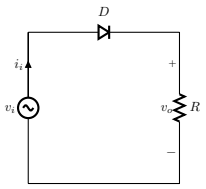
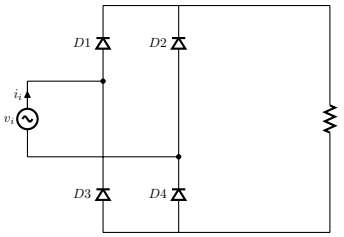
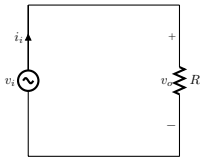
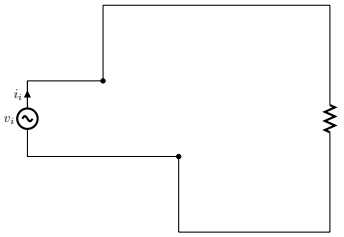
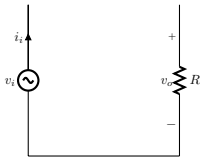
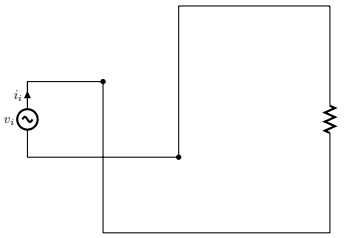
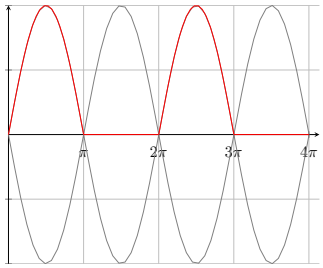
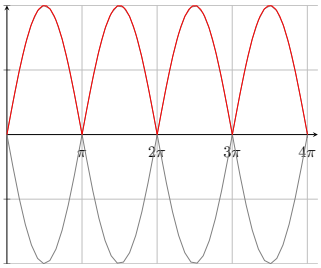
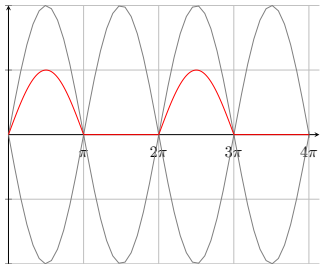
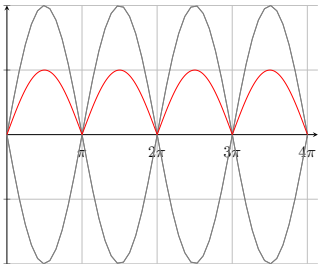
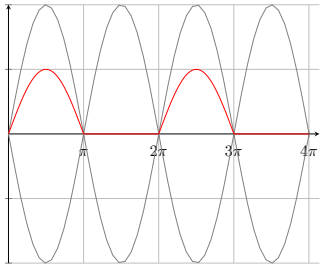
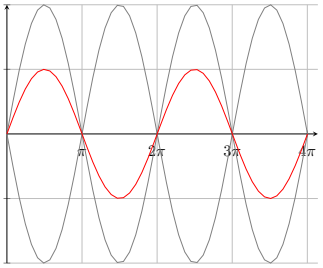
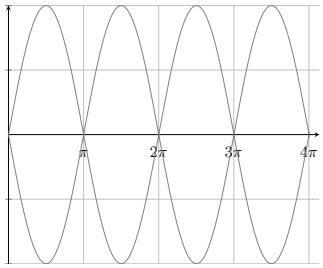
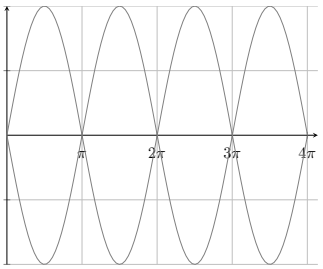
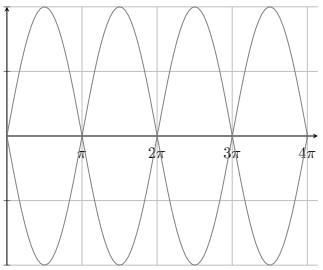
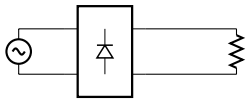
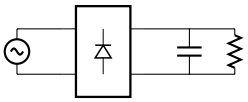
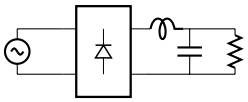
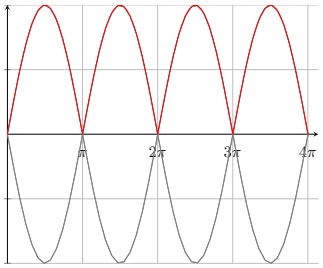
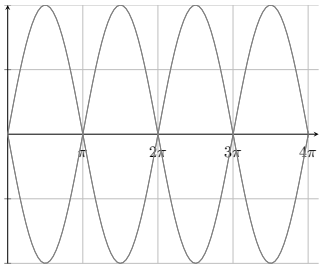
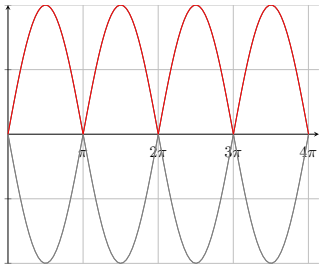
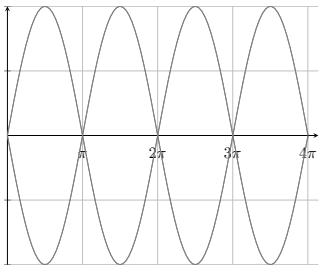
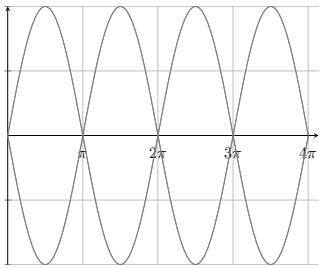
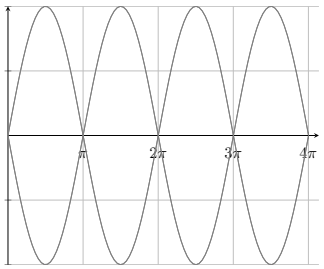
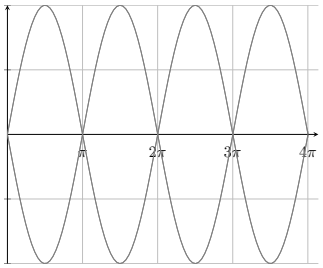
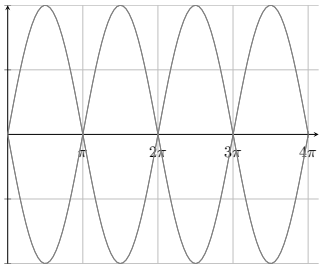
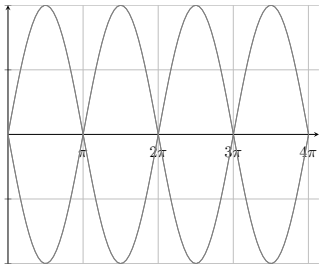
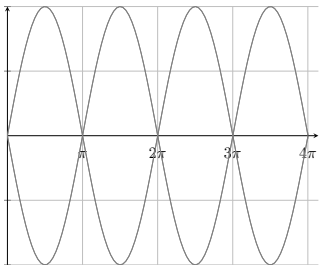
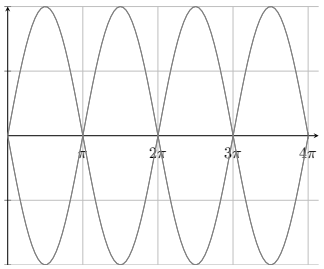
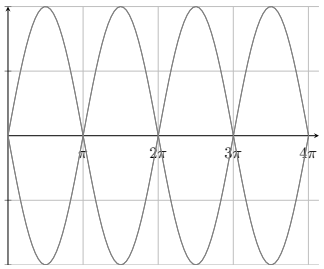
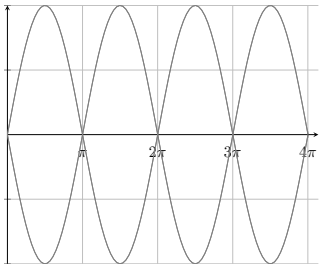
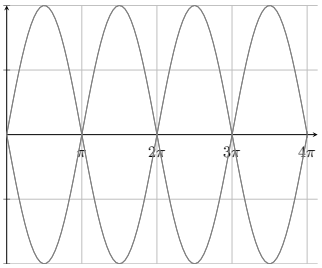
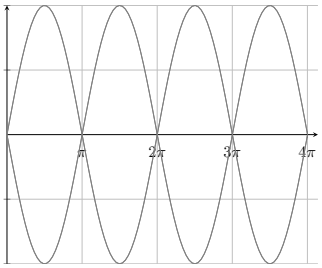
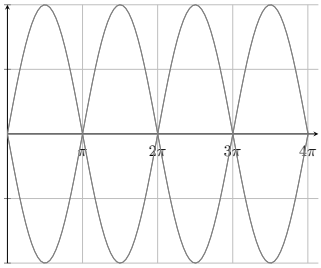
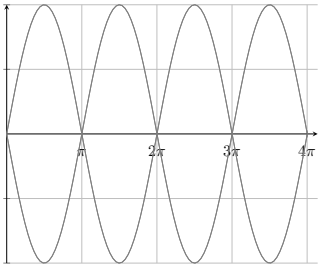
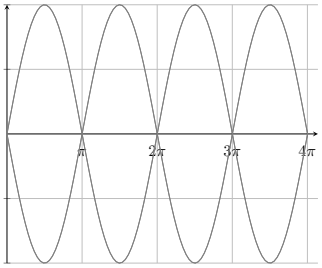
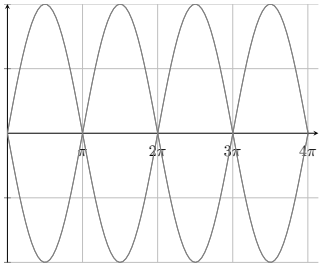
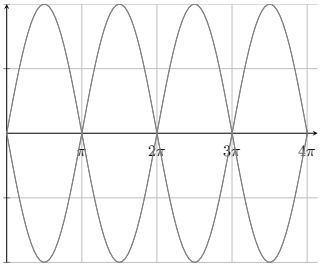
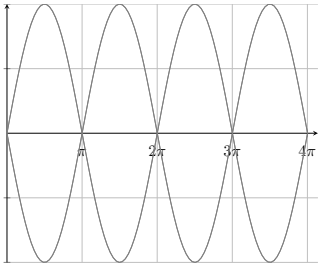
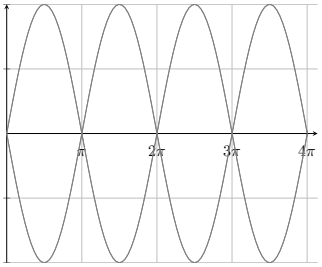
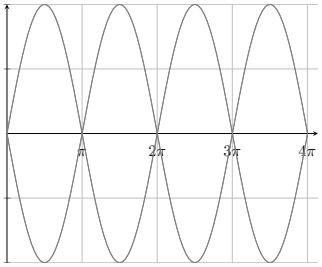
1.1 Monophasic Uncontrolled Rectifiers with R load

What	Half Wave Rectifier	Full Wave Rectifier
Circuit Diagram		
$v_i > 0$ equivalent		
$v_i < 0$ equivalent		
Diode table		
v_o		
$\bar{v_o}$	$\bar{v_o} = \frac{V_{ip}}{\pi}$	$\bar{v_o} = \frac{2V_{ip}}{\pi}$

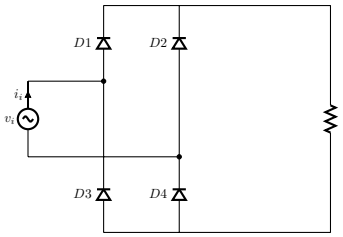
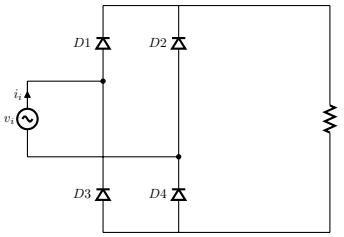
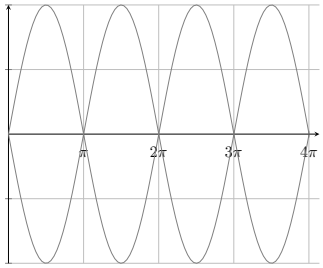
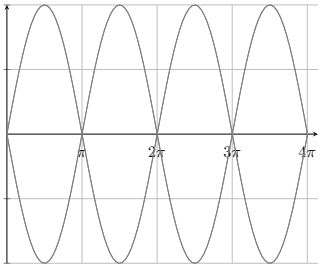
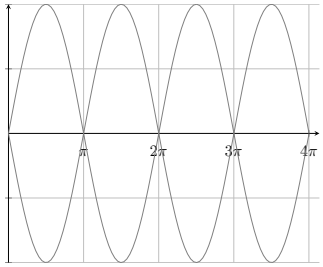
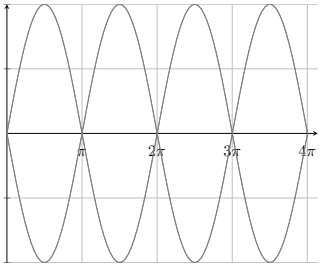
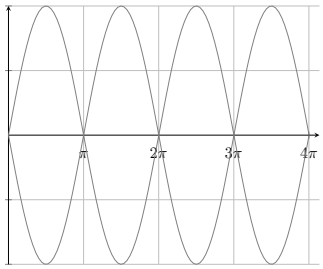
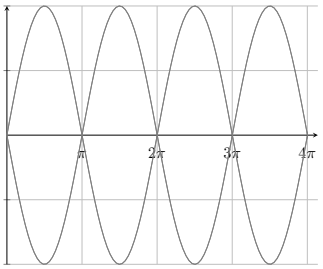
$i_o = i_R$		
i_i		
Diodes Voltage v_d		 

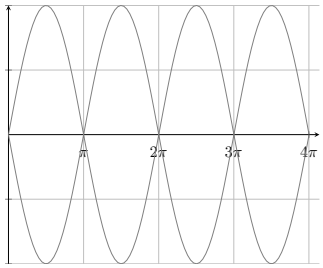
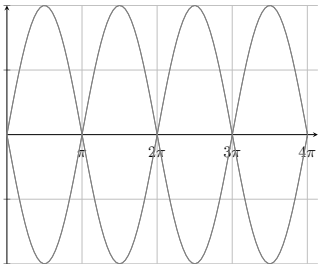
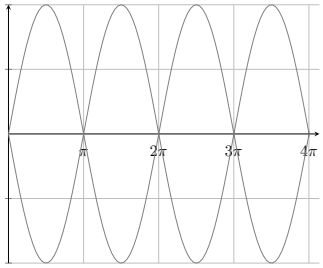
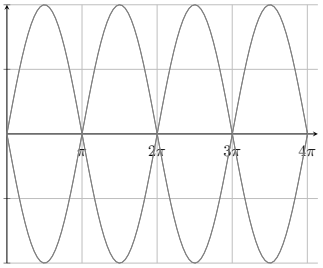
1.2 Monophasic Uncontrolled Full Wave Rectifier loads

What	R load	RC load	RLC load
Circuit Diagram			
v_o			
v_R			
$v_{\bar{R}}$			
i_R			
i_o			

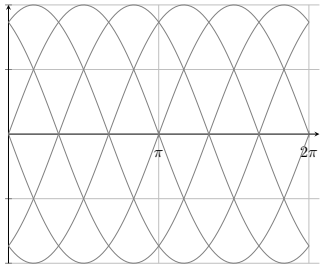
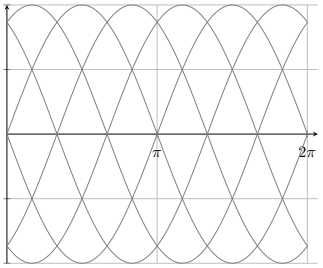
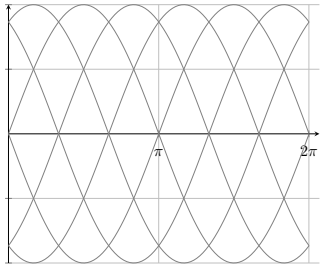
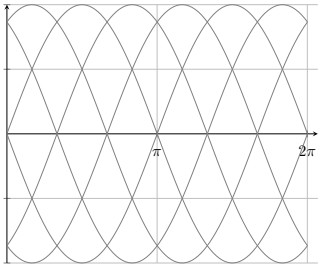
i_i			
i_{D1}			
i_{D3}			
i_C	No capacitor		

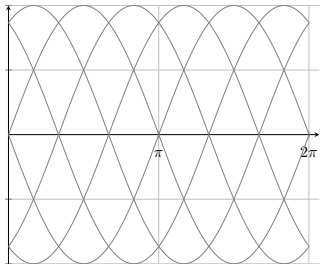
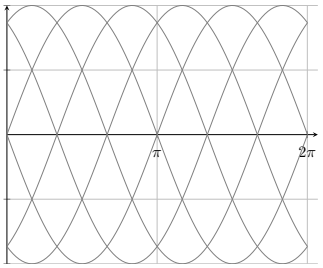
1.3 Monophasic Controlled Full Wave Rectifier, R vs RL load

What	Controlled FWR R load	Controlled FWR RL load
Circuit Diagram		
v_o		
v_R		
$\bar{v_o}(\alpha)$	$\bar{v_o} = \frac{V_i}{\pi}(\cos(\alpha) + 1)$	$\bar{v_o} = \frac{2V_i}{\pi}\cos(\alpha)$
Thyristor table		
$i_o(t)$		
$\bar{i_o}$		

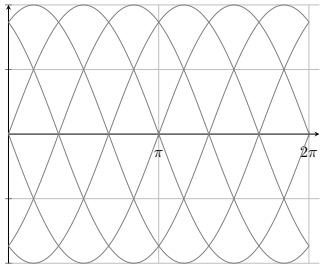
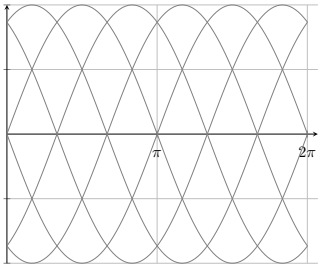
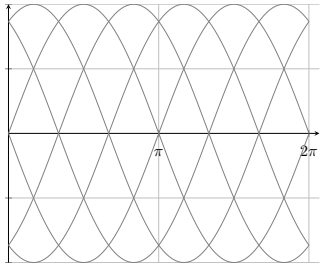
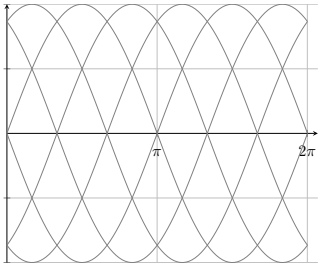
$i_i(t)$		
$v_{T1}(t)$		
Power Factor		

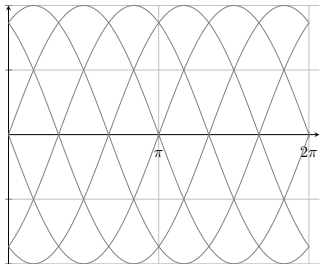
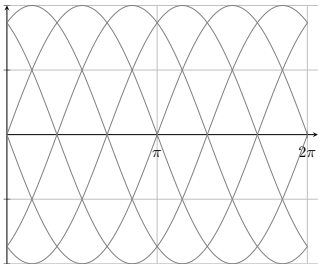
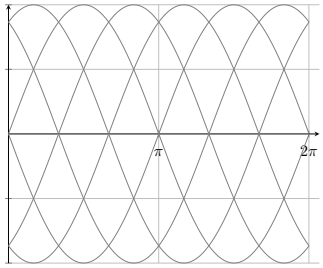
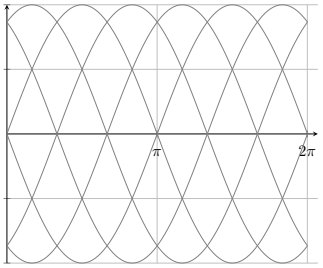
1.4 Triphasic Uncontrolled Rectifiers with R load

What	3Φ Half Wave Rectifier	3Φ Full Wave Rectifier
Circuit Diagram		
v_o		
Peaks/period	3 peaks/period	3 peaks/period
Period	$\frac{2\pi}{3}$	$\frac{2\pi}{6} = \frac{\pi}{3}$
Integration limits	$\frac{\pi}{6}, \frac{5\pi}{6}$	
Load Voltage	Phase Voltage	Line Voltage
$\bar{v_o}$		
Diode table		
i_o		

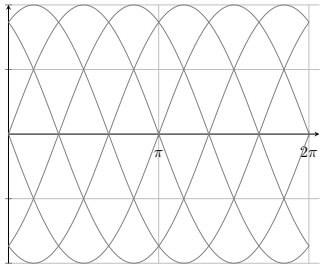
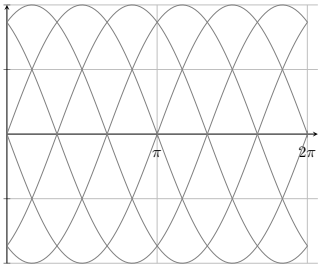
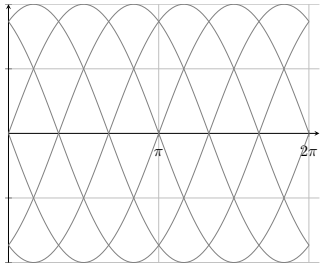
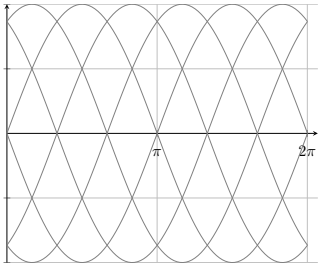
i_i		

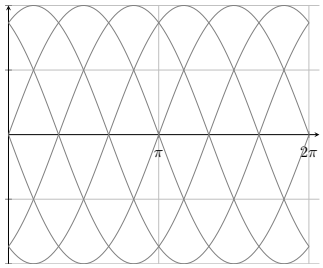
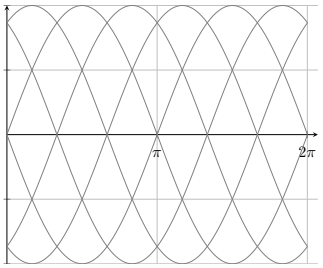
1.5 Triphasic Controlled Half Wave Rectifier, R vs RL load

What	3Φ Controlled HWR R load	3Φ Controlled HWR R load
Circuit Diagram		
v_o		
v_R		
Peaks/period	3 peaks/period	3 peaks/period
Period		
Integration limits		
Load Voltage		
$\bar{v_o}(\alpha)$		
Thyristor table		

i_o		
i_i		

1.6 Triphasic Controlled Full Wave Rectifier, R vs RL load

What	3Φ Controlled FWR R load	3Φ Controlled FWR R load
Circuit Diagram		
v_o		
v_R		
Peaks/period	6 peaks/period	6 peaks/period
Period		
Integration limits		
Load Voltage		
$\bar{v_o}(\alpha)$		
Thyristor table		

i_o		
i_i