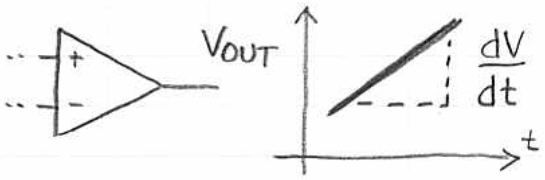
# SLEW RATE LIMITING

## WHAT IT IS:




MAXIMUM $dV/dt$ POSSIBLE AT OP-AMP OUTPUT

"SPEED LIMIT"

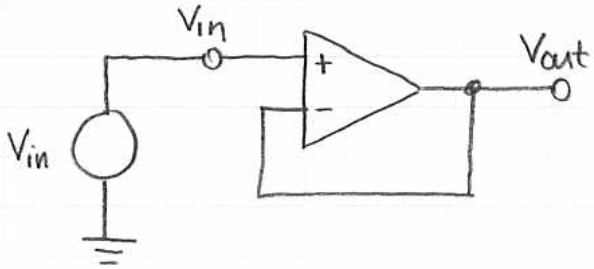
## ANALYSIS PROCEDURE

1) DETERMINE OUTPUT $V_{OUT}(t)$ FROM LINEAR BEHAVIOR (TRANSFER FUNCTION, 1ST ORDER STER RESPONSE)

2) CALCULATE $dV_{OUT}(t)/dt$

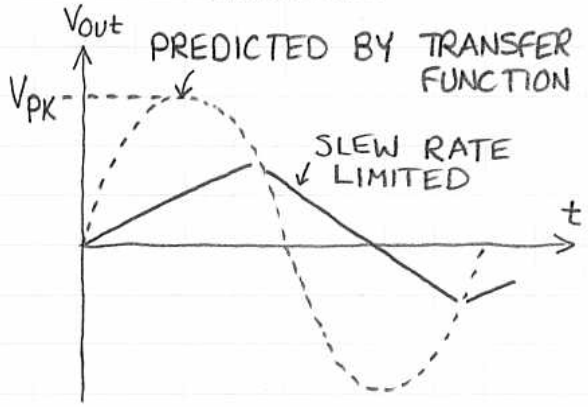
3) SEE IF MAX $dV_{OUT}(t)/dt$ EXCEEDS SLEW RATE LIMIT

## EXAMPLE: LM741




LM741
SLEW RATE LIMIT
$0.5 \frac{V}{\mu sec}$

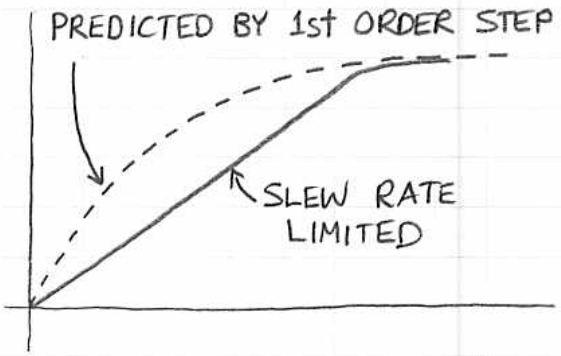
### SINUSOID




$$V_{out}(t) = V_{PK} \sin(2\pi f t)$$

$$\frac{dV_{out}(t)}{dt} = \underbrace{2\pi f V_{PK}}_{\text{MAX } \frac{dV}{dt}} \underbrace{\cos(2\pi f t)}_{\text{MAX}=1}$$

### STEP




$$V_{out}(t) = V_f - (V_f - V_I) e^{-t/\tau}$$

$$\frac{dV_{out}(t)}{dt} = \underbrace{\frac{(V_f - V_I)}{\tau}}_{\text{MAX } \frac{dV}{dt}} \underbrace{e^{-t/\tau}}_{\text{MAX}=1 \text{ at } t=0}$$