Ex: 2.29

For the input voltage step of magnitude V the output waveform will still be given by the exponential waveform of equation(2.40)

If $w_t V \leq SR$

That is $V \leq \frac{SR}{w_t} \Rightarrow V \leq \frac{SR}{2\pi f_t}$

$V \leq 0.16$ V, thus, the largest possible input voltage step is 0.16 V.

From Appendix F we know that the 10% to 90% rise time of the output waveform of the form of equation (2.40) is $t_r \simeq 2.2\frac{1}{w_t}$

Thus, $t_r \simeq 0.35\ \mu s$

If an input step of amplitude 1.6 V (10 times as large compared to the previous case) is applied, the the output is slew-rate limited and is linearly rising with a slope equal to the slew-rate, as shown in the following figure.

2.123

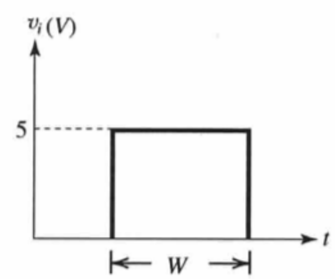
Op Amp slew rate = 10 v/μs

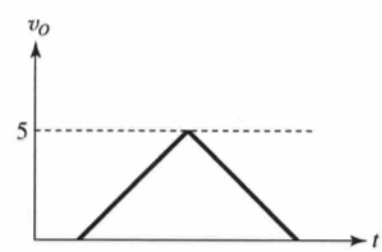
For the input pulse to rise $5V_1$, it will take

$$\frac{5}{10} = 0.5\ \mu s$$

∴ The minimum pulse width = $W = 0.5\ \mu s$

The output will be a triangular with 10 V/μs slew rate





2.126

$$v_o = 10\sin\omega t \Rightarrow \frac{dv_o}{dt} = 10\omega\cos\omega t \Rightarrow \left.\frac{dv_o}{dt}\right|_{max}$$

$$= 10\ \omega$$

The highest frequency at which this output is possible is that for which:

$$\left.\frac{dv_o}{dt}\right|_{max} = SR \Rightarrow 10\omega_{max} = 60 \times 10^{+6} \Rightarrow \omega_{max}$$

$$= 6 \times 10^5$$

$$\Rightarrow f_{max} = 45.5\ kHz$$