Name:_____   ECE 2210   homework # 23   A.Stolp
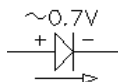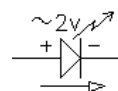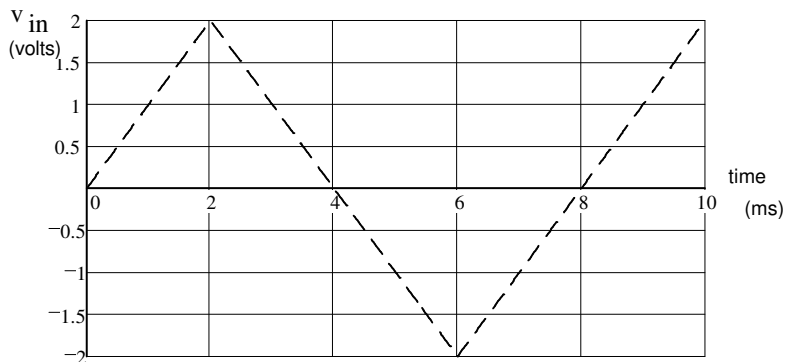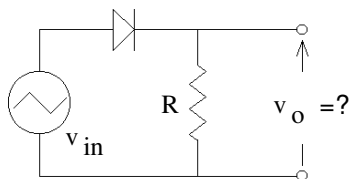   rev a
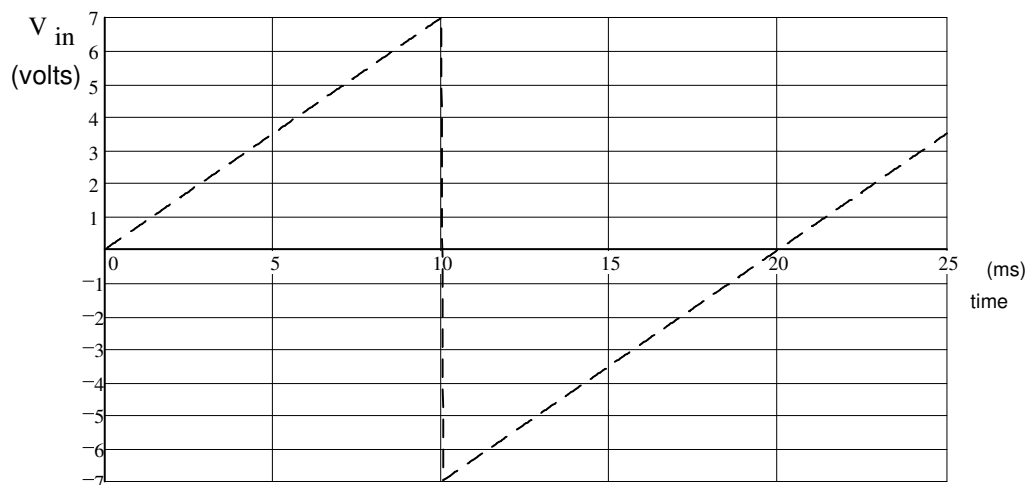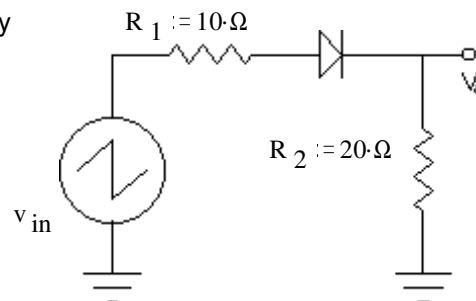
Assume the diodes are silicon   ~0.7V   Assume the LEDs have a   ~2v
with a 0.7V forward voltage drop: +▷|−   2V forward voltage drop: +▷|−

1. The input voltage to the circuit below is shown at right
   (dotted line). Show the output voltage across the
   resistor. Make it accurate and label the important
   voltages **and** times. You can draw your answer right
   on my drawing, that's why the input is shown as a
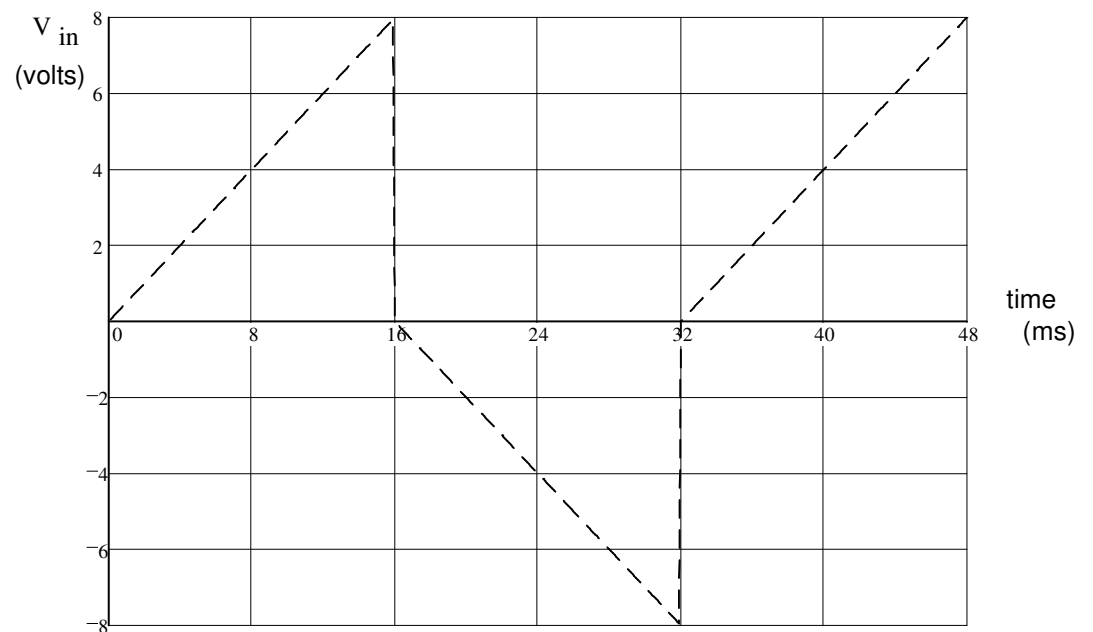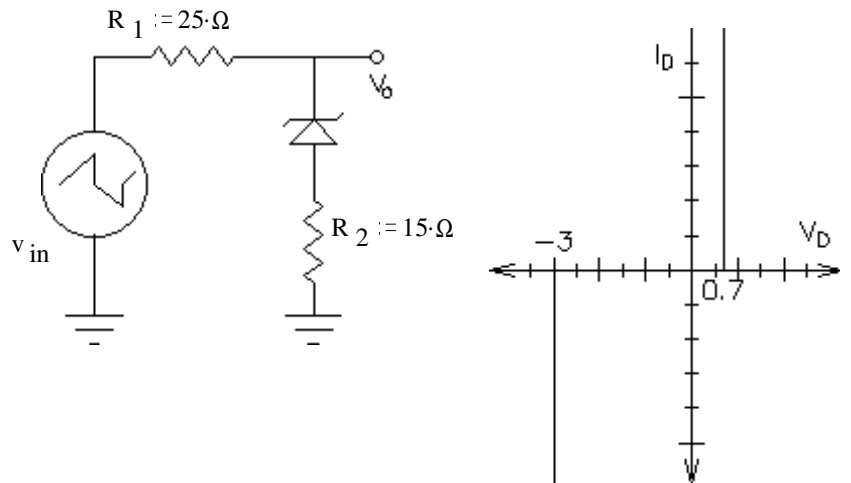   dotted line.

v_{in} =?

R

v_o =?

2. The voltage waveform shown (dotted line) is applied to the circuit. Accurately
   draw the output voltage you expect to see across the $20\ \Omega$ resistor.
   Label the important voltages **and** times.

$R_1 := 10 \cdot \Omega$

$R_2 := 20 \cdot \Omega$
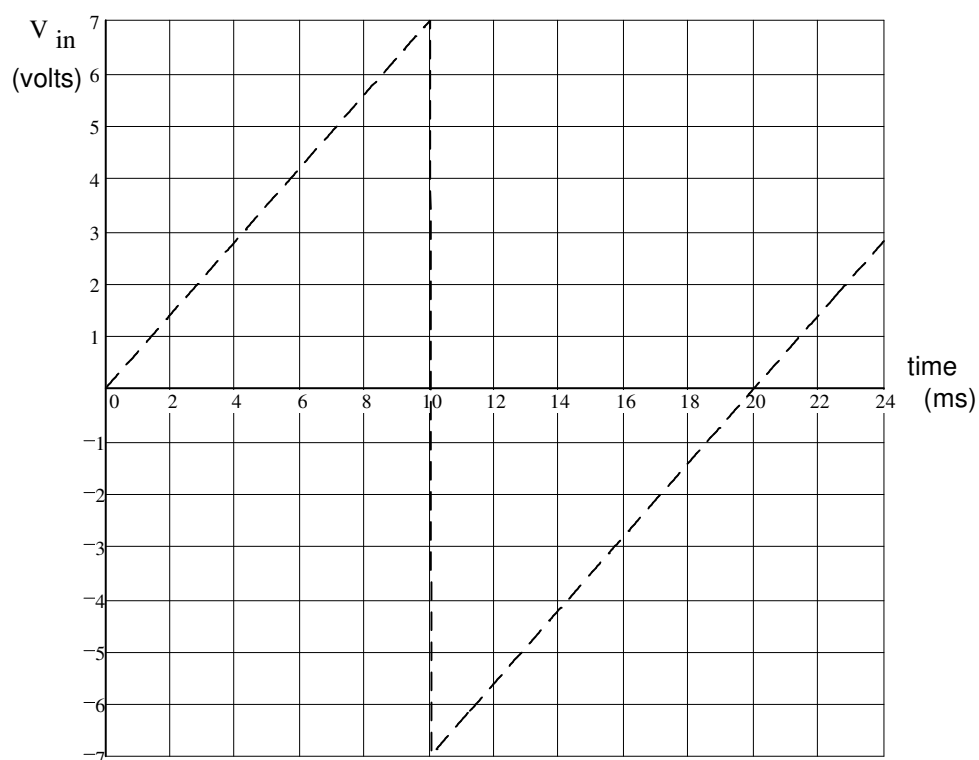
v_{in}

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3. The voltage waveform shown below is applied to the circuit shown. Accurately draw the output voltage (v_o) you expect to see. The characteristic curve for the 3-V silicon zener diode is also shown.
   Label important times **and** voltage levels.

$R_1 := 25 \cdot \Omega$

v_o

$R_2 := 15 \cdot \Omega$

v_{in}

I_D

V_D

-3

0.7

V_{in} (volts)

time (ms)

8

6

4

2

-2

-4

-6

-8

0   8   16   24   32   40   48

4. A voltage waveform (dotted line) is applied to the circuits shown.
   Accurately draw the output waveform (v_o) you expect to see.
   Label important times **and** voltage levels.

$R_1 := 40 \cdot \Omega$

v_o

v_{in}

LED

D_1

D_2

$R_2 := 23 \cdot \Omega$

V_{in}
(volts)

time
(ms)

5. A voltage waveform (dotted line) is applied to the circuits shown.
   <u>Accurately</u> draw the output waveform (v_o) you expect to see.

   Label important times **and** voltage levels.
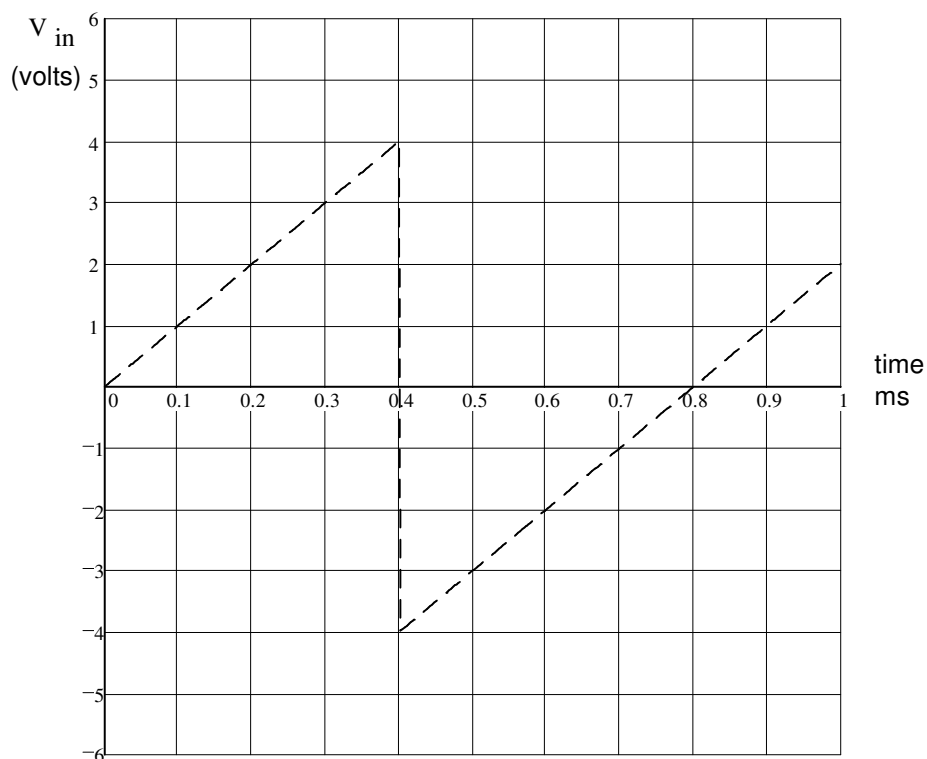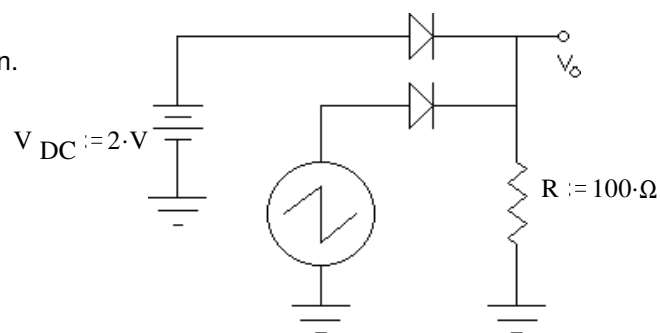
$V_{DC} := 2 \cdot V$

$R := 100 \cdot \Omega$

V $_{in}$
(volts)

time
ms

Answers

1 Straight lines between the following points: (0ms,0V), (0.7ms,0V), (2ms,1.3V), (3.3ms,0V), (8.7ms,0V), then ramps
   up as between 0.7ms & 2ms.
2. Straight lines between the following points: (0ms,0V), (1ms,0V), (10ms,4.2V), (10ms,0V), (21ms,0V), then
   ramps up as between 0.7ms & 10ms.
3. Straight lines between the following points: (0ms,0V), (6ms,3V), (16ms,4.875V), (16ms,0V), (17.4ms,-0.7V), (32ms,-3.438V),
   (32ms,0V), (38ms,3V), then ramps up as between 6ms & 16ms.
4. Straight lines between the following points: (0ms, 0), (2.86ms, 2V), (10ms, 2V), (10ms, -3V), (19ms, -0.7V), (22.86ms, 2V), flat at 2

5. Straight lines between the following points: (0ms,1.3V), (0.2ms,1.3V), (0.4ms,3.3V), (0.4ms,1.3V), (1ms,1.3V) .