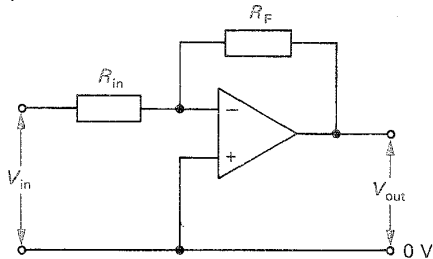


Questions on OpAmps

Q1

In the circuit below the power supply to the op amp is $\pm 9V$ and the input voltage $V_{in} = +1V$.

- (a) If $R_F = 20k$ and $R_{in} = 10k$ what is (i) the voltage gain G_v and (ii) the output voltage V_{out} ?
 (b) If $R_F = 200k$ and $R_{in} = 10k$ what is V_{out} ?



N.B. Power supply connections not shown

Q2

The graph of V_{out} against V_{in} for the voltage amplifier of Fig. 2a is shown in Fig. 2b. The op amp works on $\pm 5V$.

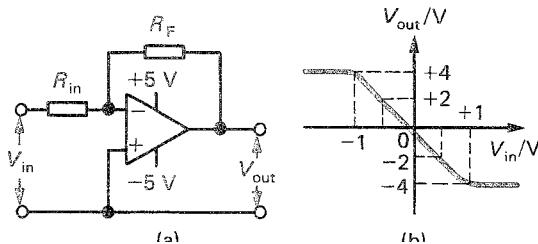
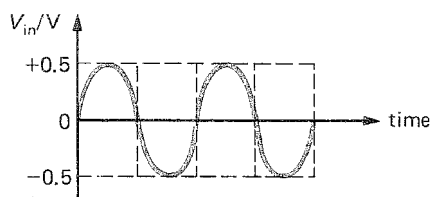


Fig. 2

- (a) For what range of V_{in} is the response linear?
 (b) What is the value of G_v in this range?
 (c) If $R_F = 20k$ what will be the value of R_{in} to give this value of G_v ?
 (d) If an a.c. input of $0.5V$ peak is applied to the input, find from the graph the peak a.c. output voltage.
 (e) If the diagram below shows the waveform of the a.c. input in (d), sketch the corresponding output waveform, showing values.
 (f) Repeat (e) for an a.c. input of peak value $2V$.



Q3

In the circuit of Fig. 3 the power supply to the op amp is $\pm 9V$ and the input voltage $V_{in} = +1V$.

- (a) If $R_2 = 20k$ and $R_1 = 10k$ what is (i) the voltage gain G_v and (ii) the output voltage V_{out} ?
 (b) If $R_2 = 200k$ and $R_1 = 10k$ what is V_{out} ?

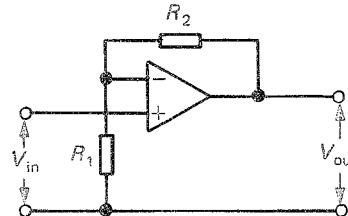
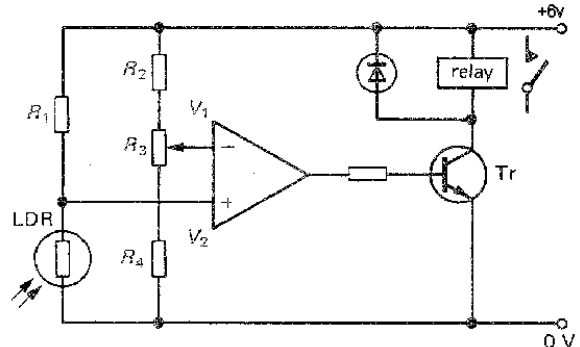


Fig 3

Q4

The light-operated switch in Fig. 4 uses an op amp as a voltage comparator.

- (a) How must V_1 and V_2 compare if the op amp output is to be negative in daylight?
 (b) In darkness what happens to (i) the LDR (ii) V_2 compared with V_1 (iii) the output of the op amp, (iv) Tr (v) the relay?
 (c) How would you alter the circuit to make the relay be off in the dark and switched on in daylight?



Q5

(a) In the circuit of Fig. 5 is V_{out} positive or negative when S is (i) closed, (ii) open? (Hint. Consider the value of V_1 in each case.)

