

Problem 3

Given:

- Current limiting resistor (R) = 3.3Ω
- LED is ideal (short circuit)
- Charge of the battery = 5200 mAh
- Battery nominal voltage = 11.1 V

Required:

The number of batteries connected in parallel to light the LED for more than 5 hours

Analysis:

- Assuming the battery needs to be charged at 20%, so the we can use up to 80% of charge of the battery = $80\% * 5200 = 4160 \text{ mAh}$
- To calculate the charge needed to power drive the circuit we need to get the current:

$$\text{The discharge current} = \frac{\text{battery voltage}}{\text{circuit resistance}} = \frac{11.1}{3.3} \approx$$

3.36 A

- Total Capacity = discharge current * discharge time
$$= 3.36 * 5 = 16.8 \text{ Ah} = 16800 \text{ mAh}$$
- Number of batteries (5 hours) = $\frac{\text{total capacity}}{\text{battery capacity}}$

$$= \frac{16800}{4160} \approx 4.038$$

batteries

So to light the box for more than 5 hours we need at least 5 batteries connected in parallel.

