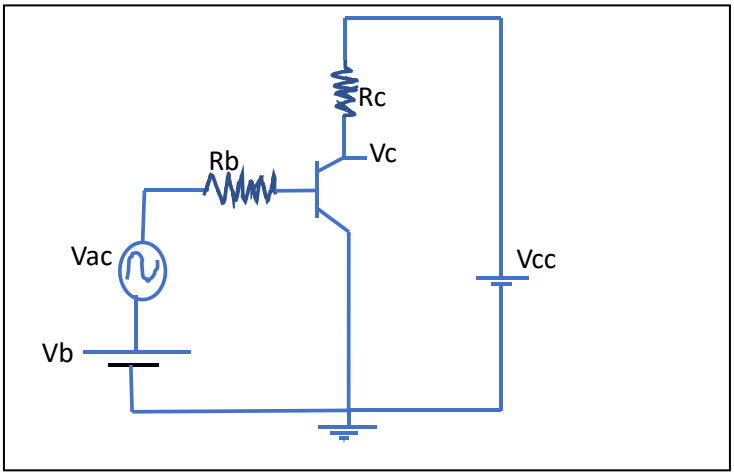
Birzeit University

PHYS336 Final Exam February 2 2021

1- In the adjacent cartoon. Rb=200 kΩ, Rc=10 kΩ, Vb=1 V, Vac=0.3cost Volt, Vcc=20V, β=200, V_{BE}=0.7V. Find



A) The maximum value of current flowing into Rb

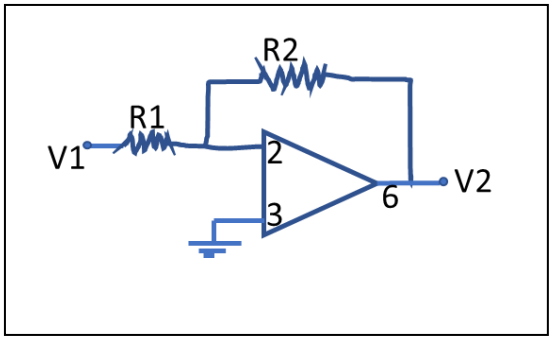
B) The current flowing into the emitter of the transistor

C) The highest voltage for V_C

D) The lowest voltage at Vc

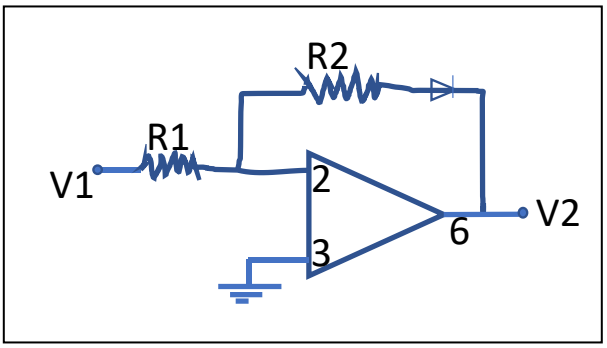
E) Plot VC(t)

2- The adjacent is an Operational Amplifier circuit with R1=5 kΩ and R2=200kΩ.



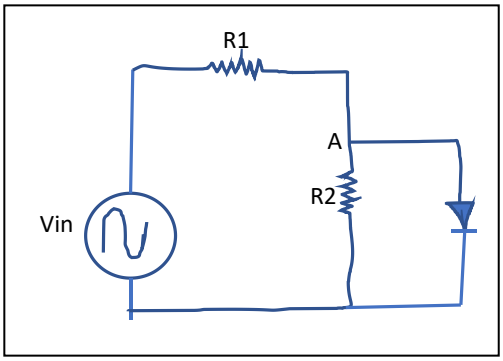
A) Derive the relation between V2 and V1 (show V2 as a function of V1). Show all your steps.

B) If a diode with Vd=0.7V forward voltage drop is added between R2 and V2, what is the relation between V2 and V1?



3) In the adjacent diode circuit, R1=20kΩ, R2=10kΩ, Vin(t)=12 cos(t) Volts, and the forward voltage across diode is 0.65 V.

a) Plot Vn(t) and V_D(t) showing multiple cycles



b) Find the current through R2

C) Find the currents through R1 and through the diode

4) Use sketches to explain the principle of operation of
A) the diode B) The bipolar junction transistor, and C) the field effect transistor