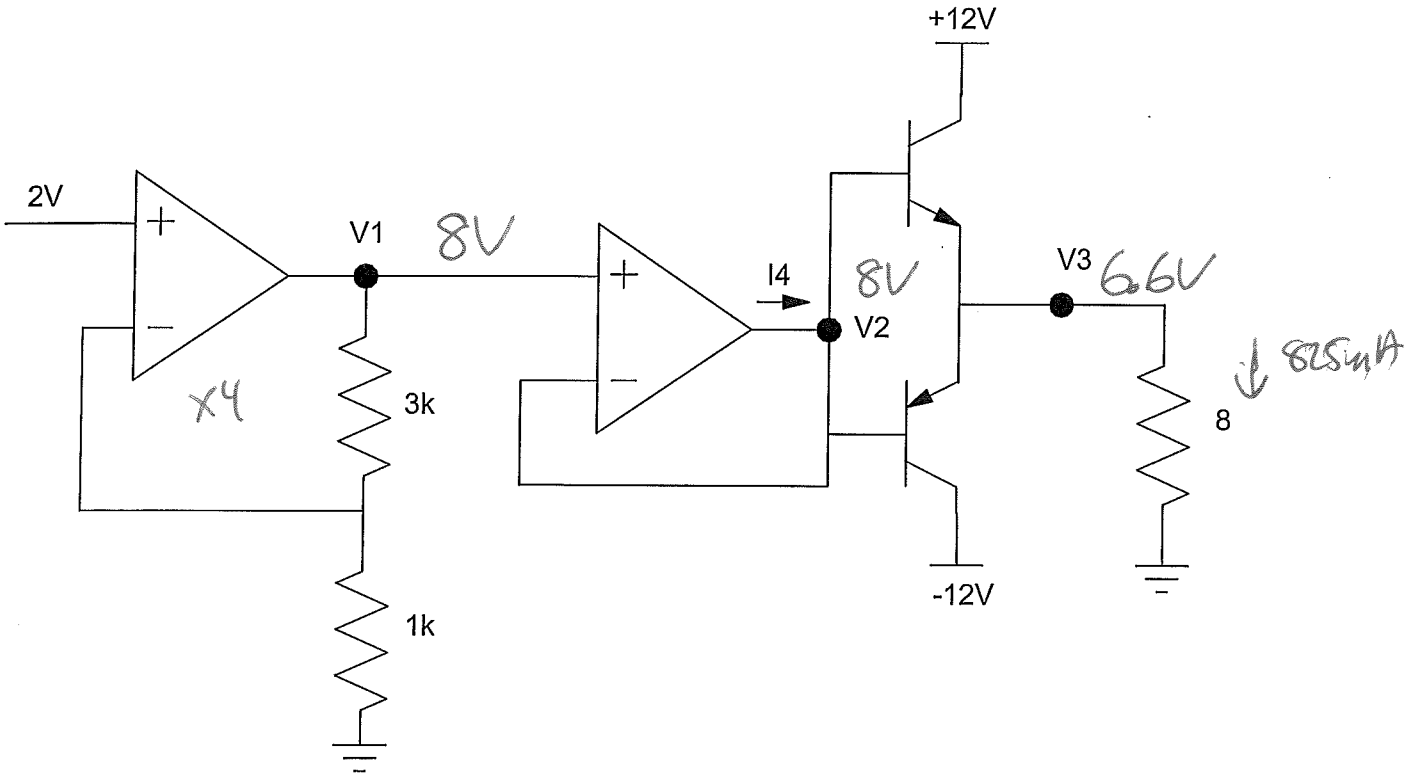
ECE 321 - Quiz 3: Name _____

April 16, 2015

1) For the following push-pull amplifier, determine the voltages and currents. Assume the transistors are Darlington pairs with

- Vf = 1.4V
- Current Gain = 1000 ($\beta = 1000$)

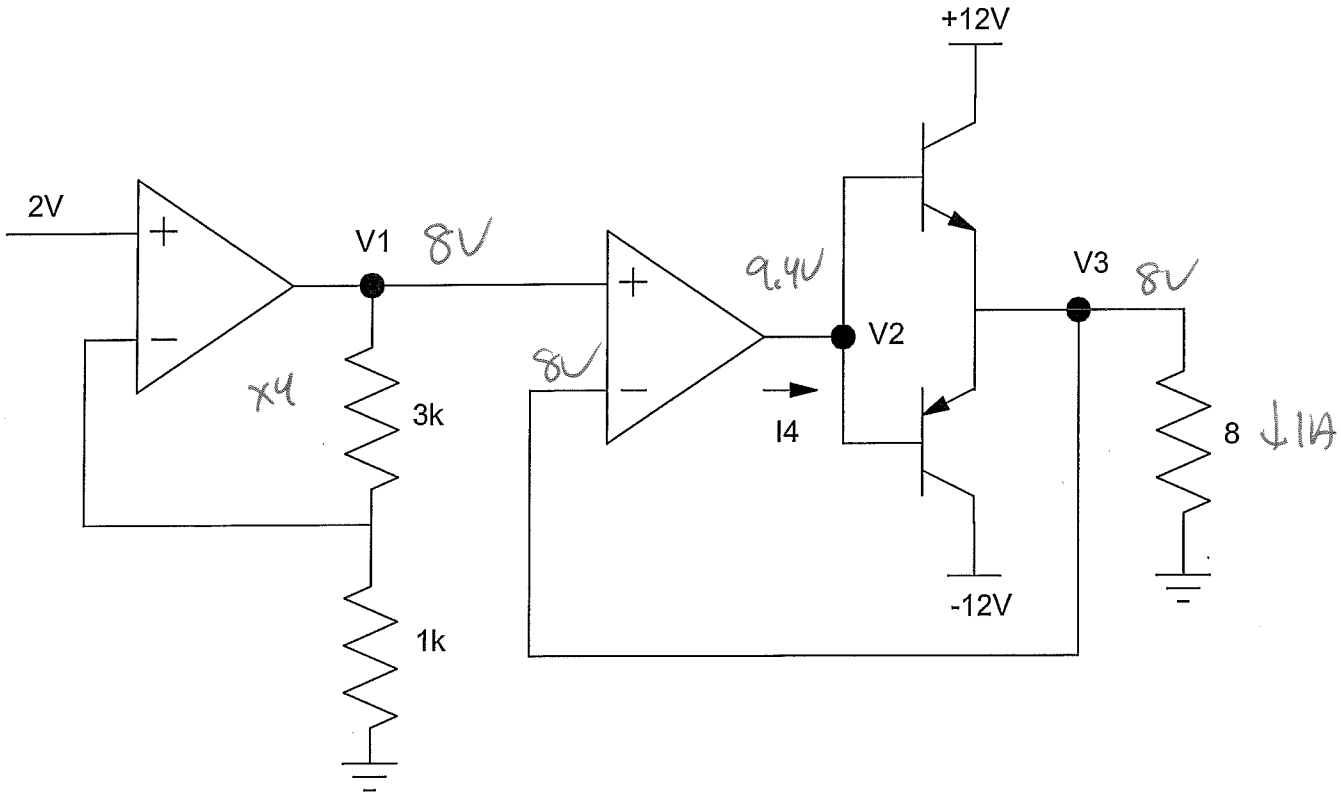
V1	V2	V3	I4
8V	8V	6.6V	824μA (or 825μA)



2) For the following push-pull amplifier, determine the voltages and currents. Assume the transistors are Darlington pairs with

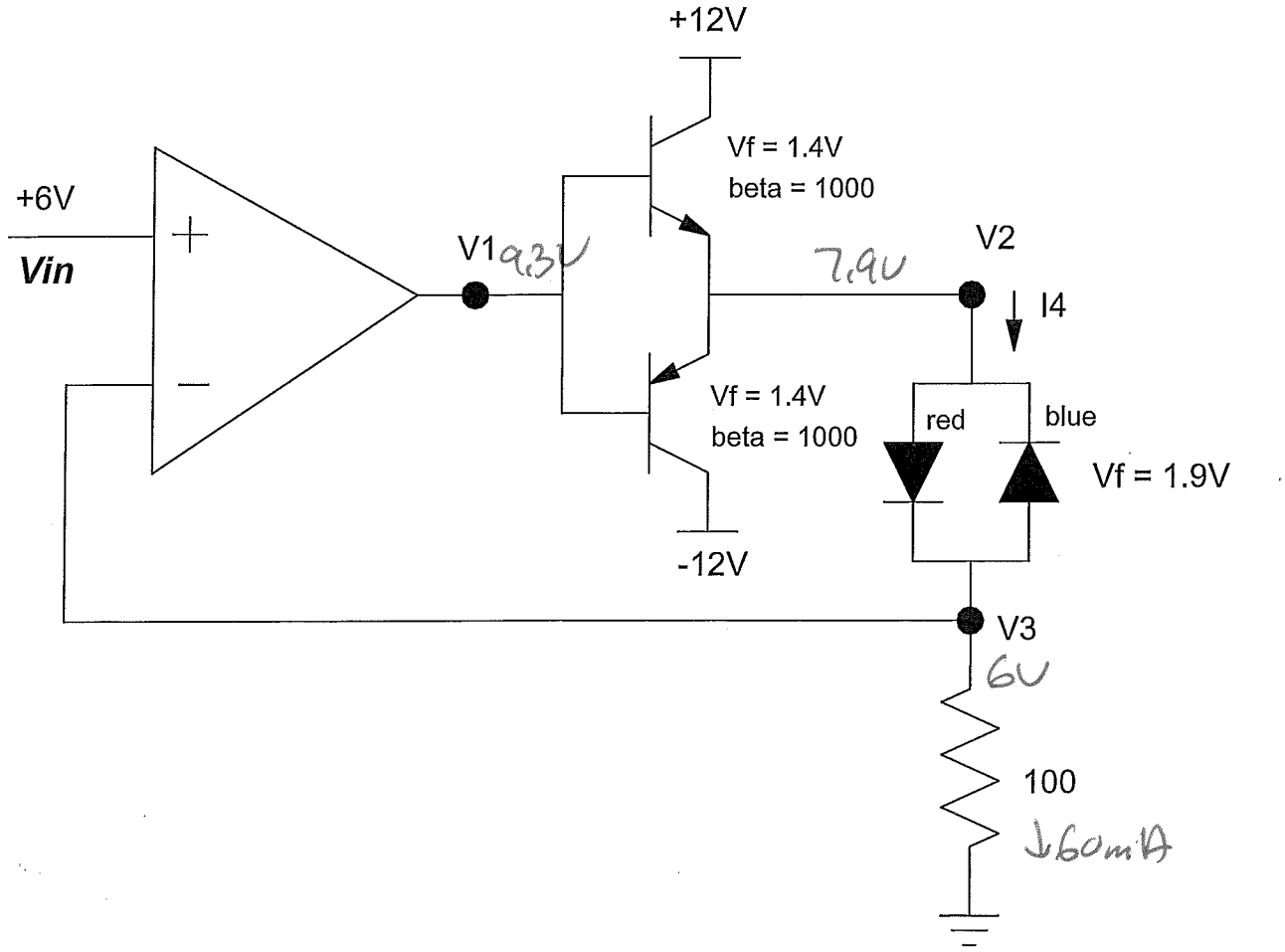
- Vf = 1.4V
- Current Gain = 1000 ($\beta = 1000$)

V1	V2	V3	I4
8V	9.4V	8V	~~KCL~~ 1mA



3) The following circuit is a voltage controlled current source. Determine the voltages and the current gain. Assume TIP112 and TIP117 transistors (Darlington pairs with Vf = 1.4V, $\beta = 1000$).

V1	V2	V3	Current Gain: Kn I4 = Kn Vin
9.3V	7.9V	6V	$\frac{1}{100}$



4) Assume a circuit has the following transfer function

$$Y = \left(\frac{200(s+2)}{(s+9)}\right)X$$

What is the differential equation which describes this circuit (i.e. the differential equation relating X and Y?)

Find y(t) assuming $x(t) = 6\sin(7t)$

Differential Equation	y(t)
$y' + 9y = 200(x' + 2x)$	~~t>3~~ $766\sin(7t + 36^\circ)$

$(\quad)_{s=j7} \cdot 6\sin(7t)$

$(127.7\angle 36^\circ) \cdot 6\sin(7t)$

5) Assume a circuit has the following transfer function

$$Y = \left(\frac{200s}{s^2+2s+25}\right)X$$

Find y(t) assuming

$$x(t) = 2 + 3\sin(5t) + 4\cos(314t)$$

y(t) = $0 + 300\sin(5t) + 2.54\cos(314t - 89^\circ)$

$s=0$ | $s=j5$ | $s=j314$

gain=0 | gain=100 | gain= $.637\angle -89^\circ$

$y=0$ | $y=300\sin(5t)$ | $y=2.54\cos(314t-89^\circ)$

Bonus! The Clean Water Act of 1972 regulates the discharge of pollutants into U.S. waters and regulates the water quality of surface waters. In spite of this law, the fracking industry has a record of rendering ground water and surface water undrinkable - to the point that water out of the tap will actually burn. How is this permitted under the Clean Water Act?

Haliburton Act made the fracking indestry immune to the clean water act and clean air act.

- filters
- 2 parts