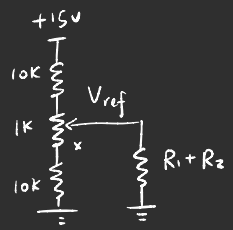
Post lab 6.

1.



$$V_{ref} = \frac{x+10k}{10k+1k+10k} \cdot 15 = \frac{x+10k}{21k} \cdot 15 \quad (0 \le x \le 1k\Omega)$$

$$V_{ref,max} = \frac{11k}{21k} \cdot 15 = 7.86\,V$$

$$Z_{in} = R_1 + R_2 = 22k\Omega + 680k\Omega = 702k\Omega$$

$$V_{ref,load} = 15V \times \frac{(10k\Omega + 1k\Omega) \,//\, 702k\Omega}{10k\Omega + (10k\Omega + 1k\Omega) \,//\, 702k\Omega} = \boxed{7.79\,V}$$

2. $$Z_{out} = \frac{10.5k\Omega}{2} = 5.25k\Omega$$

$$V_{ref,load} = 15V \times \frac{702k\Omega}{702k\Omega + 5.25k\Omega} \approx 7.44V \quad \text{with load adjust} < 7.5\,V.$$

3. $R_2 = 680k\Omega$. For finger resistance $R_f = 100k\Omega$.

$$R_{eq} = \frac{R_2 \cdot R_f}{R_2 + R_f} = \frac{680k\Omega \cdot 100k\Omega}{680k\Omega + 100k\Omega} = 87.2k\Omega \Rightarrow \boxed{R_{eq} = 87.2k\Omega}$$

4. After touching R_2, $R_2' = 87.2k\Omega$.

$$V_{out} = -\frac{R_2'}{R_1} \cdot 0.1\sin(\omega t) = -\frac{87.2k\Omega}{22k\Omega} \cdot 0.1\sin(\omega t) \approx -0.396\sin(\omega t)\,V$$

$$\Rightarrow \boxed{V_{out} = -0.396\sin(\omega t)\,V}$$