a) At normal body temperature, 37°C, the voltage should be at midrail.

If \( R = K_T \cdot 25K\Omega @ 37°C \), select \( R_2 = 37K\Omega \)

At \( T = 20°C \), \( V_{out} = \frac{20V \cdot 20K\Omega}{20K\Omega + 25K\Omega} = 8.9V \).

At \( T = 50°C \), \( V_{out} = 10.9V \).

Circuit should work for desired temperature range.

b) The voltage swings \( 10V - 8.9V = 1.1V \) below midrail and \( 10.9V - 10V = 0.9V \) above midrail.

\[ \frac{10V}{1.1V} = 9.09 \]

Select a gain of 9, inverting amplifier OK.

c) \( V_R^2 = 4KTR \)

\[ = 4 \cdot 1.8 \times 10^{-27} \cdot \frac{3}{K} \cdot 0.15K \cdot 100 \mu A \]

\[ = 1.6 \cdot 10^{-15} \frac{V^2}{K^2} \]
\( \frac{V^2}{R} = 4KTR \delta f = 1.6 \cdot 10^{-15} \frac{V^2}{Hz} \cdot 100 \text{ KHz} = 1.65 \cdot 10^9 V^2 \)

\[ \text{RMS} = \sqrt{4KTR \delta f} = 12.8 \mu V \]

c) Pick a BAC \( x = 10 \mu F \)

\[ f_{\text{LPF}} = \frac{1}{2\pi RC}, \quad R = \frac{1}{2\pi f_C} \approx 16 K\Omega \]

\[ \text{Filter} \quad \begin{array}{c} \text{16 K}\Omega \\ \text{10 } \mu \text{F} \end{array} \]

\( \text{x BAC} = \text{Big Ass Capacitor} \)