

9.45 - Cold Air - Standard analysis
 - Brayton Cycle

SHOW

$$bwr = \frac{T_1}{T_4}$$

$$bwr = \frac{\dot{w}_c / \dot{m}}{\dot{w}_t / \dot{m}} = \frac{h_2 - h_1}{h_3 - h_4}$$

Cold, Air Standard

$$bwr = \frac{c_p (T_2 - T_1)}{c_p (T_3 - T_4)}$$

$$bwr = \frac{T_2 - T_1}{T_3 - T_4} = \frac{T_1 (T_2/T_1 - 1)}{T_4 (T_3/T_4 - 1)}$$

For isentropic processes and constant (c_p, c_v):

$$\frac{T_2}{T_1} = \left(\frac{P_2}{P_1} \right)^{\frac{k-1}{k}}$$

$$\frac{T_3}{T_4} = \left(\frac{P_3}{P_4} \right)^{\frac{k-1}{k}}$$

$$\frac{P_2}{P_1} = \frac{P_3}{P_4} \Rightarrow \frac{T_2}{T_1} = \frac{T_3}{T_4}$$

$$bwr = \frac{T_1}{T_4}$$

