Phys102 (Sec # 42) Quiz # 5 (Ch.20)

Name: Key ID #

1- A Carnot refrigerator has a coefficient of performance equal to 6. If the refrigerator expels 80 J of heat to a hot reservoir in each cycle, find the heat absorbed from the cold reservoir.

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$$\frac{Q_L}{Q_H} = T_L$$

$$K = \frac{|Q_L|}{|W|} = \frac{|Q_L|}{|Q_H| - |Q_L|} = 6$$

$$\frac{|Q_L|}{80 - |Q_L|} = 6 \Rightarrow |Q_L| = 480 - 6\,|Q_L|$$

$$|Q_L| = \frac{480}{7} = \boxed{68.6 \text{ J}}$$

2- A 100 g of ice at -5 °C is placed in a lake whose temperature is 25 °C. Calculate the change in entropy of the lake.

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$$\Delta S = \frac{Q_{lost}}{T} = \frac{-[m_i c_i (0-(-5)) + m_i L_f + m_i c_w (25-0)]}{298}$$

$$= \frac{-[0.1(2220)(5) + 0.1(3.33\times10^5) + 0.1(4180)(25)]}{298}$$

$$= -150.5 \ \frac{J}{k}$$