Physics 213 exam 1 (Ch 14, 19-22) review
DRAFT

The exam will be during class Friday, Feb. 12. You may bring a calculator and writing/erasing implements. Tables of data, constants, and conversion factors from the book will be provided as well as equations as shown below. Expect about 1 page of short-answer/qualitative questions (comparison, explain what concepts apply, etc.) and about three pages of calculational/quantitative questions (similar to homework problems). The end-of-chapter summaries are good for giving an overview of the material. Remember that for full credit it’s your responsibility to show your work, which means clearly stating the concepts/equations you’re using and what numbers you’re taking as input, carrying out mathematical manipulations in a clear way, and presenting a clearly-labeled answer with units and a reasonable number of significant digits.

\[
P \equiv \frac{F}{A} \quad P = P_0 + \rho gh \quad B = m_{\text{fluid}} g = \rho_{\text{fluid}} g V
\]

\[
T_F = \frac{9}{5} T_c + 32 \quad T_K = T_c + 273.15 \quad \Delta L = \alpha L \Delta T \\
\Delta V = \beta V \Delta T = 3 \alpha V \Delta T
\]

\[
PV = N k_B T \\ PV = nRT
\]

\[
Q = mc \Delta T \\
Q = \pm mL \\
W = -\int_{V_i}^{V_f} P dV \\
\Delta E_{\text{int}} = Q + W
\]

\[
P = \frac{Q}{\Delta t} = k A \frac{T_h - T_c}{L} \\
P = \frac{Q}{\Delta t} = \alpha A e T^4
\]

\[
W = -P \Delta V \\
W = nRT \ln \left( \frac{V_i}{V_f} \right) \\
PV^\gamma = \text{const}
\]

\[
\frac{1}{2} m v^2 = \frac{3}{2} k_B T \\
E_{\text{int}} = \frac{f}{2} N k_B T = \frac{f}{2} nRT \\
Q = n C_v \Delta T \\
Q = n C_p \Delta T
\]

\[
v_{\text{rms}} = \sqrt{\frac{3 k_B T}{m}}
\]

\[
W_{\text{eng}} = |Q_h| - |Q_c| \\
e = \frac{W_{\text{eng}}}{|Q_h|} = 1 - \frac{|Q_c|}{|Q_h|} \\
e_c = 1 - \frac{T_c}{T_h}
\]

\[
COP = \frac{|Q_h|}{W} \\
COP = \frac{|Q_c|}{W} \\
P = \frac{W}{\Delta t}
\]

\[
dS \equiv \frac{dQ_r}{T} \\
\Delta S = \int_{T_i}^{T_f} \frac{dQ_r}{T}
\]