Physics 107 (Kaldon-22243) **Name** _____

WMU - Spring 2001
Exam 3 - 100,000 points

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State Any Assumptions You Need To Make – Show All Work – Circle Any Final Answers
Use Your Time Wisely – Work on What You Can – Be Sure to Write Down Equations
Short Answers Should Be Short! – Feel Free to Ask Any Questions

"Fact or Fiction" (30,000 points) *Multiple-Guess-Pick-The-Best-Answer-Fill-In-The-Bubbles*

1.) (a) Making the Hot Reservoir hotter (T_H increases) changes the _____ Efficiency…
A = Actual B = Carnot C = Second Law D = None of these
Ⓐ Ⓑ Ⓒ Ⓓ

(b) …and makes this efficiency _____ than before.
A = Larger B = Smaller C = The Same D = None of these
Ⓐ Ⓑ Ⓒ Ⓓ

(c) Making the Cold Reservoir colder (T_C decreases) changes the _____ Efficiency.
A = Actual B = Carnot C = Second Law D = None of these
Ⓐ Ⓑ Ⓒ Ⓓ

(d) …and makes this efficiency _____ than before.
A = Larger B = Smaller C = The Same D = None of these
Ⓐ Ⓑ Ⓒ Ⓓ

(e) A temperature gauge in town read +25 on Saturday June 9th. This temperature could only be measured in:
A = °F B = °C C = Kelvins D = None of these
Ⓐ Ⓑ Ⓒ Ⓓ

(f) A temperature gauge reads -321. This temperature could only be measured in:
A = °F B = °C C = Kelvins D = None of these
Ⓐ Ⓑ Ⓒ Ⓓ

(g) A temperature gauge reads -40. This temperature could NOT be measured in:
A = °F B = °C C = Kelvins D = None of these
Ⓐ Ⓑ Ⓒ Ⓓ

A single frequency note is played on one string of a stringed instrument like a violin. It is the fundamental.
(h) If the string is tightened, then the frequency *f* of the new note will be _____ than the old note.
A = Higher B = Lower C = The Same D = None of these
Ⓐ Ⓑ Ⓒ Ⓓ

(i) If the string is tightened, the wavelength λ of the new note will be _____ than the old note.
A = Higher B = Lower C = The Same D = None of these
Ⓐ Ⓑ Ⓒ Ⓓ

(j) If the string is tightened, the wave speed *v* of the new note will be _____ than the old note.
A = Higher B = Lower C = The Same D = None of these
Ⓐ Ⓑ Ⓒ Ⓓ

Kraft® Macaroni & Cheese Dinner™ – The Official Food of the Bachelor (35,000 points)

2.) Tony gets home to his cheap apartment and puts a pan of water on to boil. 1.800 kg of water at 20°C (68°F) will take some time to come to a boil, so Tony goes and plays some video games. But when he gets back to the stove, 1.500 kg of the water has boiled away, leaving only 0.300 kg of water boiling in the pan. (a) How much energy did the room temperature water have to absorb to get to this point?
$c_{water} = 4186\ J/kg\cdot°C$, $L_f = 334{,}000\ J/kg$ and $L_v = 2{,}260{,}000\ J/kg$.

(b) Tony now has to boil some more water, but this time he puts the water in a tea kettle and waits for it to whistle. When it does whistle, the sound has a wavelength of 11.6 cm ($\lambda = 0.116\ m$) and the speed of sound in the kitchen is 348 m/s. What is the frequency *f* of this whistle?

(c) A nearby drinking glass is just under 5¾" tall (14.5 cm) and it resonates with this sound wave. Which resonance is this? Fundamental, first overtone, second overtone, etc.?

(d) Tony pours some Coca-Cola™ into the glass ($\rho_{Coke} = 1060\ kg/m^3$) and adds a one cubic inch ice cube ($0.0250\ m \times 0.0250\ m \times 0.0250\ m$ *dimensions*, $\rho_{ice} = 917\ kg/m^3$). The ice cube floats level in the glass. How much of the *0.0250 m* height is submerged?

(e) To wash his pans after his Mac & Cheese dinner, Tony turns on the faucet and water comes out 8.72 m/s. If the water pressure in the pipe came just from a water tower, how high would the water be compared to Tony's kitchen sink faucet?