Department of Physics, University of Maryland, College Park, MD 20742-4111

Physics 404 **HOMEWORK ASSIGNMENT #7** **Fall 2014**

Due date: Tuesday, Oct. 28 **Deadline:** Thursday, Oct. 30

1. (8) 5.32 Debunks a common belief about how ice skating works. In part (c), just write the formula to use; plugging in numbers gives about 1½ km. In part (d), assume that the contact area is about 10 cm^2 (and give a brief justification why this is reasonable) and take the skater's mass as 60 kg.

2. (3 @ 5 = 15) 5.48, 5.50, and 5.51. Casting the van der Waals equation into reduced form. For 5.48 you need only *verify* these results, not derive them. (I.e., assume the given results and plug in to show that they satisfy the pair of equations for the critical value.) Problem 5.50 is a one-liner about the compression factor for vdW. Problem 5.51 asks you to verify explicitly the reduced equation written in the Deserno posting.

3. (6) 5.60 (Trace the solid lines of Fig. 5.31, then draw in the appropriate dashed lines with arrows.)

4. (5) 5.62 Derivation of the lever rule.

5. (6) 5.80 Deriving the shift in boiling temperature ΔT from the Clausius-Clapeyron equation. Start from Raoult's law: $\Delta p = p - p^0 = -(N_B/N_A)\, p^0$, where p^0 is the original vapor pressure, that of the pure A system.

Those of you who are intrigued by the idea of distinctive behavior near critical points might want to look at S 5.55 (too long to assign).

5.58 is very nice but too long to assign.