

140a HW 1, 1/8/19

★ All numbered exercises are from Blundell and Blundell. Due 1/15/19.

1. 1.4
2. 3.1.
3. 3.7a.
4. 4.2.
5. 4.3.
6. Consider dealing 10 cards from a shuffled deck of 52 playing cards. What is the probability of correctly guessing all 10 cards (their order does not matter). Write it in terms of factorials and then estimate it as a number.
7. **QUESTION 7 IS DEFERRED TO THE NEXT HW SET SINCE I DID NOT GET TO THE M.B. VELOCITY DISTRIBUTION**

Containers  $A$  and  $B$  are in thermal contact and in equilibrium with each other. Container  $A$  contains an ideal gas of oxygen molecules, while container  $B$  contains an ideal gas of nitrogen molecules. Suppose that  $N_A/N_B = 3$  and  $V_A/V_B = 5$ , and  $P_A = 90Pa$ .

- (a) What is  $P_B$ ?
- (b) What is  $v_{RMS}^A/v_{RMS}^B$  the ratio of the RMS speeds of molecules?
- (c) Suppose that the thermal contact between the two containers suddenly dissolves, so now all the molecules can explore the container of volume  $V_A + V_B$  (whose external walls are secure, and thermally insulated). Will  $v_{RMS}$  change? Why / why not?
- (d) What is the pressure in the container  $A + B$  after the wall dissolved?