

Physics 831 Quiz #8 - Friday, Oct. 24

YOUR NAME: \_\_\_\_\_

Consider a two-dimensional array of  $N$  coupled two-dimensional harmonic oscillators, i.e., the oscillators only move in the  $x - y$  plane.

1. At low temperature, the specific heat per oscillator can be expressed as:

$$\frac{1}{N} \frac{dE}{dT} = \alpha T^n.$$

What is the power  $n$ ? \_\_\_\_\_

2. What is the specific heat per oscillator at high temperature? \_\_\_\_\_

3. If one doubles the spring constant in (1) the parameter  $\alpha$  will:

- (a) quadruple
- (b) double
- (c) increase by  $\sqrt{2}$
- (d) stay the same
- (e) fall by  $1/\sqrt{2}$
- (f) fall by  $1/2$
- (g) fall by  $1/4$ .

4. If one doubles the number of oscillators in (1) while keeping the area fixed, the parameter  $\alpha$  will:

- (a) quadruple
- (b) double
- (c) increase by  $\sqrt{2}$
- (d) stay the same
- (e) fall by  $1/\sqrt{2}$
- (f) fall by  $1/2$
- (g) fall by  $1/4$ .