1. The density of single-particle states for a non-interacting Fermi gas has the form, \( D(\epsilon) = A\epsilon^\alpha \). What is \( \alpha \) for a:

(a) 3-D non-relativistic gas

(b) 2-D non-relativistic gas

(c) 1-D non-relativistic gas

(d) 3-D gas of massless particles

(e) 2-D gas of massless particles

(f) 1-D gas of massless particles

2. For a low temperature Fermi gas the excitation energy has the form \( E^* = AT^\alpha \), where the volume and DENSITY are fixed. What is \( \alpha \) for a:

(a) 3-D non-relativistic gas

(b) 2-D non-relativistic gas

(c) 1-D non-relativistic gas

(d) 3-D gas of massless particles

(e) 2-D gas of massless particles

(f) 1-D gas of massless particles

3. For a low temperature Fermi gas the density changes by an amount \( \delta \rho = AT^2 \), where the volume and CHEMICAL POTENTIAL are fixed. Is \( A \) positive, zero or negative for a:

(a) 3-D non-relativistic gas

(b) 2-D non-relativistic gas

(c) 1-D non-relativistic gas

(d) 3-D gas of massless particles

(e) 2-D gas of massless particles

(f) 1-D gas of massless particles