**ESS 312 Lab 3 - Making diamonds - answer sheet**

**Q1 (a)** graphite + O2 ↔ CO2

 H = S =

 diamond + O2 ↔ CO2

 H = S = at 298 K / 1 bar (incl units).

**(b)** graphite ↔ diamond

 ΔH =

 ΔS = at 298 K / 1 bar (include units).

**(c)**  ΔGgraphite ↔ diamond = at 298 K / 1 bar (include units).

 The stable polymorph at 298 K / 1 bar is:

**Q2 (a)** ΔGgraphite ↔ diamond (T, Pr) =

**(b)** Enter values for each piece of the formula (write out expressions for each of the definite integrals before substituting values into them):

ΔGgraphite ↔ diamond (Tr, Pr)

+ Tr ΔSgraphite ↔ diamond (Tr, Pr)

– T ΔSgraphite ↔ diamond (Tr, Pr)

Add these up to get ΔGgraphite ↔ diamond (1300, 1 bar) =

**(c)** ΔGgraphite ↔ diamond (T, P) = ΔGgraphite ↔ diamond (T, Pr) +

**(d)** Co-existence pressure (ΔGgraphite ↔ diamond (1300, P) = 0) :

**Q3** Clapeyron slope:

Sgraphite ↔ diamond = (use 298 K / 1 bar values; include units).

Vgraphite ↔ diamond = (use 298 K / 1 bar values; include units).

dP/dT = S / V =

**Q4** What do your results imply about the origin of these diamonds, and the structure and development of the oldest (Archean) continents preserved on Earth?