

(11.1) The quantum numbers  $s = 1/2$  and  $l = 2$  are assigned to a particle. (a) If spin and orbital movements are independent, how many space orientations (and thus measured spectral lines if no degeneration of energy states occur) are possible in an external field of such a strength that both movements are affected? (b) How many lines would be observed if spin and orbital movements are coupled?

**(a)**  $s = \frac{1}{2}$      $l = 2$      $l = (-2, -1, 0, 1 \text{ and } 2)$  for each of  $s = (-1/2 \text{ and } +1/2)$  gives 10 combinations

**(b)** Also 10.