Marks 4

- Write down the ground state electron configurations for the following species.
  Na is given as an example.

Na	[Ne] $3s^1$
K	
As	
Sr	
C^+	

Name the elements described by the following configurations.

[Kr] $5s^2\ 4d^6$
[Xe] $6s^2\ 5d^1\ 4f^{11}$

Marks 3

- Imagine a Universe X in which electron spin did not exist. *i.e.* An electron has only a single internal state instead of the two spin states it has in our universe. Assume that all other properties of electrons and nuclei in Universe X are identical to those in our universe.

What are the atomic numbers of the first two alkali metals in Universe X?

Write down the ground state electron configuration of the atom with atomic number 11 in Universe X.

How would the energy difference between the 2*s* and 2*p* orbitals compare between our universe and Universe X? Provide a brief explanation of your answer.

- Imagine a Universe X in which electrons had *three* possible spin states (*i.e.* with electron spin quantum numbers –1, 0 and +1) instead of the two they have in our universe. Assume that all other properties of electrons and nuclei in Universe X are identical to those in our universe.

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What are the atomic numbers of the first two noble gases in Universe X?

Write down the ground state electron configuration of the atom with atomic number 14 in Universe X.

How would the energy difference between the 2*s* and 2*p* orbitals in multi-electron atoms compare between our universe and Universe X? Give a brief explanation of your answer.