CHEM1101 Worksheet 5 – Answers to Critical Thinking Questions

The worksheets are available in the tutorials and form an integral part of the learning outcomes and experience for this unit.

**Model 1: Molecular Orbitals**

1. ![Diagram of bonding and antibonding σ and π orbitals]

2. see above

**Model 2: σ, σ*, π, and π* Orbitals**

3. See above and below.

4. See above and below.
Model 3: Molecular Orbital Diagrams

5. See overleaf.

6. See overleaf. 
Bond order = \( \frac{1}{2} (8 - 2) = 3 \)

7. See overleaf. 
Bond order = \( \frac{1}{2} (8 - 4) = 2 \)

8. A double bond contains 1 \( \sigma \) + 1 \( \pi \) 
A triple bond contains 1 \( \sigma \) + 2 \( \pi \)

9. Bond order in \( N_2 \) is higher than in \( O_2 \) (because there are more electrons in the bonding orbitals of \( N_2 \) than \( O_2 \)) so the bond energy as well as the bond strength in \( N_2 \) is higher than in \( O_2 \).

10. See overleaf. 
Bond order = \( \frac{1}{2} (8 - 3) = 2.5 \)
NO