1. You have isolated a novel septapeptide hormone.

- Acid hydrolysis and amino acid analysis yields: Met, Glu, Leu, Ile, Ala
  Only five amino acids. Septa=7 so two are missing. Could be repeats or Trp.
  Glu could be Gln.
- Treatment with PITC yields a Glutamine-phenylhydantoin.
  Q is N-terminus
  Q-X-X-X-X-X-X
- Treatment with carboxypeptidase yields Leucine.
  L is C-terminus
  Q-X-X-X-X-X-L
- Treatment with trypsin yields no product.
  Cleaves after R.K. NO R,K in amino acid analysis. Ignore this clue.
- Treatment with chymotrypsin yields a tetrapeptide containing Leu, Met, Glu and Ile.
  Cleaves after F,Y,W. Tetrapeptide liberated which puts the cleavage site after residue 3 or 4. Tetrapeptide contains Leu which is C-terminus so the tetrapeptide is C-terminal and cleavage must occur after residue 3. No F or Y in amino acid analysis so the aromatic must be W – one of the mystery reisdues. W must be residue 3 to yield a tetrapeptide.
  Q-X-W-X-X-L
- Treatment with staphylococcal protease yields Leu.
  Cleaves after D,E. Only E appears in amino acid analysis. Leu is C-term so E must be in position 6.
  Q-X-W-X-X-E-L
- Treatment with cyanogen bromide yields a tetrapeptide that absorbs at 280nm.
  Cleaves after M. Absorbance at 280nm means an aromatic – which must be Trp so the tetrapeptide is N-terminal and cleavage occurs after residue 4 which must be Met.
  Q-X-W-M-X-E-L

Two residues remain, A and I. Looking back through clues we see Ile listed in the chymotrypsin digest which also contains Leu. So Ile must be residue 5, leaving A as residue 2.
Q-A-W-M-I-E-L
You go for a job interview at Merck pharmaceuticals. They lead you to a small room in the basement of the complex. There are two doors. One door is marked "Exit". The other door has a pneumatic seal and a lock with an alphanumeric keypad. To continue with the interview, you must decipher the keycode from the following clues.

A paper is left on the table. You pick it up and read the following:

Merck scientists have cloned a novel stress reducing peptide. Hydrolysis of the peptide reveals that it contains Lys, Leu, Asp, Ala, Pro, Met, and Val. All seven amino acids accounted for…no mystery residues, no repeats.

- Treatment with PITC yields Side chain is CH3 so N-terminal residue is Alanine
A-X-X-X-X-X-X

- Treatment with carboxypeptidase or cyanogen bromide yields Pro.
C-terminus is Pro and residue before that is Met.
A-X-X-X-X-M-P

- Treatment with chymotrypsin has no result.
No aromatic residues in amino acid analysis. All accounted for – no Trp. Ignore this clue.

- Treatment with trypsin yields a tripeptide that contains sulfur.
Cleaves after R,K. Possible cleavage after residue 3 or residue 4. Tripeptide contains sulfur = Met. So cleavage after residue 4 which is Lys.
A-X-X-K-X-M-P

- Treatment with staphylococcal protease yields a tripeptide containing the amino acids Val, Asp, and Ala.
Cleaves after D,E. Asp must be residue 3.
A-X-D-K-X-M-P
Tripeptide also contains Ala so Val must be residue 2. That leaves only Leu for residue 5.
A-V-D-K-L-M-P