Assignment 1: Due: Fri. Feb. 8, 2019

Please read questions carefully. Only 1 answer will be accepted. Pick the best possible answer.
Please look out for announcement next week as to how these responses will be submitted.

1. Why can the human proteome be larger than the human genome?
   a- existence of alternative splicing
   b- post-translational modifications
   c- different types of cells have different proteomes
   d- a and b

2. Which of the following are covalent forces?
   a- disulfide bonds, peptide bonds and isopeptide bonds
   b- hydrophobic interactions, Van der Waals forces and hydrogen bonds
   c- disulffide bonds and electrostatic interactions
   d- all of the above
   e- none of the above

3. Which of the following bonds stabilize the quaternary structure of a protein?
   a- peptide bonds
   b- disulfide bonds
   c- isopeptide bonds
   d- none of the above

4. Which reagents can be used to denature proteins in the laboratory?
   a- water
   b- B-mercaptoethanol
   c- urea
   d- B-mercaptoethanol and urea

5- Which transcription factor stimulates transcription of heat shock proteins when the cell is exposed to stress?
   a- HSF2
   b- HSF1
   c- HSF7
   d- HSF19

6. Chaperonins can normally accomodate proteins up to which size?
   a- 40 kDa
   b- 60 kDa
   c- 120 kDa
   d- 400 kDa

7. Intrinsically disordered proteins
   a- have multiple well-defined 3D structures
   b- are always unfolded
   c- are flexible proteins that allow them to engage in a range of different biological activities
   d- do not have a unique 3D structure
   e- 2 of the above answers are correct
   f- 3 of the above answers are correct

8. The properties of a protein are determined by:
   a- the types of peptide bonds
   b- the characteristics of the amino acid side chains
   c- the three-dimensional structure of the protein
   d- the types of hydrogen bonds between the α-helices and β-sheets
   e- a and b
   f- b and c

9. Amorphous aggregates and amyloid fibrils
   a- occur because there are a very large number of potentially incorrect, intermediate conformations into which a protein might fold
   b- are toxic to the cell
   c- occur when chaperones do not correctly fold proteins
   d- occur when exposed hydrophilic chains on different molecules stick to one another
   e- two of the above answers are correct
   f- three of the above answers are correct

10. The following statement about Hsp70 is correct:
   a- When bound to ADP, Hsp70 is in the open conformation
   b- Hsp70 activity is dependent upon hydrolysis of ATP
   c- Hsp70 is a chaperonin
   d- There are 3 conformational states of Hsp70
   e- All of the above answers are correct
   f- None of the above answers are correct

11. The following statement about Hsp70 function is true:
   a- When bound to ATP, Hsp70 assumes an opened conformation, exposing its hydrophobic substrate-binding pocket to hydrophobic regions of the client protein
   b- Hydrolysis of ATP causes Hsp70 to assume an opened conformation to facilitate the binding of the client protein
   c- Exchange of ATP for the ADP by NEF causes a conformational change in Hsp70 that permits release of the client protein
   d- Hydrolysis of ATP causes Hsp70 to assume a closed conformation to facilitate the release of the client protein
   e- 2 of the above statements are true
   f- none of the above statements are true

12. The following statement about Hsp90 is correct:
   a- Hsp90 is an ATP-dependent chaperonin that functions as a monomer.
   b- Hsp90 is an ATP-dependent chaperone that functions as a trimer.
   c- Hsp90 is an ATP-independent chaperonin that functions as a dimer.
   d- Hsp90 is an ATP-independent chaperone that functions as a monomer.
   e- none of the above statements are correct

13. The following information about GroEL/GroES is false:
   a- There are 4 conformational states of the protein
   b- Activity of the complex requires hydrolysis of 1 molecule of ATP
   c- the system is composed of 2 chambers, separate from eachother, and stacked one ontop of the other
   d- Proteins that are assisted by this system are always perfectly folded by this complex
   e- Two of the above statements are false
   f- Three of the above statements are false

14. Protein kinases covalently transfer the _____ to _____ residues.
   a- α phosphate from ATP / OH group of serine, threonine or tyrosine
   b- β phosphate from ADP / OH group of serine, threonine or tyrosine
   c- γ phosphate from ATP / SH group of cysteine
   d- β phosphate from ADP / SH group of cysteine
   e- γ phosphate from ATP / OH group of serine, threonine or tyrosine
   f- none of the above choices would make any sense

15. The E2 protein dissociates from E3 ligase
   a- after it has transferred its polyubiquitin chain to E3 ligase
   b- after it has transferred its polyubiquitin chain to the client protein
   c- after it has transferred its ubiquitin molecule to E3 ligase or to the target protein
   d- after the protein has been correctly folded
   e- 2 of the above answers are correct
   f- none of the above answers are correct

16. Activation of Ub in the cell
   a- occurs on its N-terminal glycine residue in an ATP-dependent process
   b- occurs on its C-terminal glycine residue in an ATP-dependent process
   c- occurs on its N-terminal glycine residue in an ATP-independent process
   d- occurs on its C-terminal glycine residue in an ATP-independent process
   e- occurs on its C-terminal cysteine residue in an ATP-dependent process

17. In the proteasome, access to the inner core of the proteolytic chamber occurs prior to
    a- ubiquitination
    b- de-ubiquitination
    c- ATP hydrolysis
    d- unfolding of the client protein
    e- none of the above

18. Autophagy describes one of the processes by which:
    a- proteins are targeted to the proteasome
    b- proteins are ubiquitinated
    c- proteins are ultimately degraded by the hydrolytic enzymes of the lysosome
    d- mitochondria are degraded by the proteasome
    e- bacteria are phagocytosed and then degraded by the lysosome
    f- none of the above

19. Prion-related diseases occur primarily because:
    a- misfolded proteins are by-passed by the ubiquitin-proteasome pathway
    b- misfolded proteins are by-passed by the pathways of autophagy
    c- misfolded proteins are resistant to cellular proteases
    d- of intrinsically disordered proteins
    e- meat is not sufficiently cooked
    f- none of the above

20. Addition of urea to a protein extract will:
    a- break hydrogen bonds and ionic interactions
    b- break disulfide bonds in an oxidation reaction
    c- form disulfide bonds in a reduction reaction
    d- break disulfide bonds in a reduction reaction
    e- 2 of the above answers are correct
    f- none of the above answers are correct