Please note that some of these questions were not written by me. Some were taken from official course practice exams, as well as other unofficial practice exams. This sheet is intended to aid in final review and should NOT be used as the only resource for studying.

1. In what order are the following complement pathways activated, earliest to latest?
a. Classical > Lectin > Alternative
b. Lectin > Classical > Alternative
c. Alternative > Lectin > Classical
d. Lectin > Alternative > Classical

2. Integrins, a type of adhesion molecule, binds to which of the following?
a. Selectins
b. L-Selectin
c. Vascular addressins
d. Ig superfamily proteins

3. What is the most abundant leukocyte in the blood?
a. Eosinophil
b. Monocyte
c. Neutrophil
d. Basophil

4. How long does it take to develop a primary adaptive immune response?
a. 1 month
b. 7-14 days
c. Immediately after infection
d. None of the above

5. Successful rearrangement of the alpha-chain locus leads to:
a. successful rearrangement of the beta-chain locus.
b. deletion of the delta-chain locus.
c. successful rearrangement of the delta-chain locus.
d. deletion of the gamma-chain locus.

6. What cell can activate naïve T-cells?
A. B-cell
B. Granulocytes
C. Macrophages
D. None of the above

7. What is the soluble C3 convertase of the alternative pathway?
A. iC3
B. iC3b
C. iC3Bb
D. C3bBb

8. What receptors are responsible for cytokine creation/secretion in macrophages?
A. Phagocytic receptors
B. NOD-like receptors
C. Toll-like receptors
D. All of the above

9. An antibody's general structure consists of 2 ___ regions and 1 ___ region.
A. Fc; Fab
B. Fab; Fc
C. Heavy chain; light chain
D. Light chain; heavy chain

10. Where are T and B cell conjugate pairs initially formed?
a. Primary follicle
b. T-cell area
c. T cell-B cell border
d. Bone marow
e. None of the above

11. ___ is the tightness of binding of an antigen binding site to an antigen; whereas ___ is the firmness of association between a multideterminant antigen and the antibodies produced against it.
A. Avidity; affinity
B. Affinity; avidity
C. Somatic hypermutation; polymorphism
D. Polymorphism; somatic hypermutation

12. What are the steps of extravasation in order?
A. Tight binding, migration, diapedesis, rolling adhesion
B. Rolling adhesion, tight binding, diapedesis, migration
C. Rolling adhesion, diapedisis, migration, tight binding
D. Migration, diapedesis, tight binding, rolling adhesion

13. True or False: Commensal species typically cause harm to the host.

14. What is the main opsonin placed on pathogen surfaces?
a. C3a
b. C3b
c. C5a
d. C5b
e. C1

15. What is the first barrier against infection?
a. Skin
b. Neutrophils
c. Mucosal surfaces
d. Macrophages
e. A & C
f. A, B, & D
g. B & D

16. What is the least abundant leukocyte in the blood?
a. Eosinophil
b. Monocyte
c. Neutrophil
d. Basophil

17. Which of the following is true about T-cell receptors?
a. They are highly specific.
b. They are secreted after a T cell has been activated.
c. They are comprised of 4 chains.
d. They can be expressed as a soluble form.
e. All of the above are true.

18. Which molecule is an anaphylotoxin?
a. C3a
b. C4b
c. C5a
d. Both A and C
e. All of the above

19. Which of the following cell types does NOT express MHC class I?
a. Erythrocytes
b. Dendritic cells

c. Hepatocytes
d. Macrophages
e. Lymphocytes

20. Jenner used the variola virus to induce immunity against the vaccinia virus.
    a. True
    b. False

21. Once the light chain has finished rearrangement, the Ig-alpha and Ig-beta genes are expected to be turned off (no longer expressed).
a. True
b. False

22. Which of the following is a zymogen in the alternative pathway?
a. Factor P
b. Factor I
c. Factor B
d. DAF

23. CR3 is a __ that recognizes ____ such as _____.
a. PAMP ; PRR ; C3b
b. PAMP ; PRR ; LPS
c. PRR ; PAMPs ; C3b
d. PRR ; PAMPs ; LPS

24. Which of the following statements about macrophages is incorrect?
a. They are expected to reside within the tissues.
b. They remain in circulation until an infection breaches the first lines of defense.
c. They are one of the first effector cells to encounter a newly established infection.
d. They can function in both innate and adaptive immune responses.
e. All of the above are correct.

25. CR-1 can:
a. Act as an opsonin
b. Be found on the surface of pathogens
c. Induce phagocytosis by binding to C3b
d. A&C
e. None of the above

26. Which of the following statements best describes the role of MHC class II molecules in the immune response?

A. They present endogenous antigens to CD8+ cytotoxic T cells
B. They present exogenous antigens to CD4+ helper T cells
C. They are expressed on all nucleated cells
D. They are involved in antibody-dependent cellular cytotoxicity (ADCC)
E. They directly activate B cells to produce antibodies

27. Which of the following is true about the degradation of extracellular proteins?
a. The peptides products will be delivered to the CD8 T cells.
b. The peptides produced will be bound to MCHI molecules.
c. The peptides produced will be found in a phagolysosome.
d. A&C
e. A,B&C

28. The first checkpoint in B cell maturation:
a. Involves a pre-BCR
b. Checks for a functional rearrangement of the light chain variable domain gene segments
c. Utilizes b2 microglobulin and VpreB attached to the heavy chain
d. A&B
e. A,B&C

29. What does a Pre-BCR consist of?
a. Heavy Chain
b. Surrogate light chain
c. VpreB
d. CD3 complex
e. A,B,&C
f. A,B,C&D

30. Where do B-cells develop?
a. Primary lymphoid tissue
b. Secondary lymphoid tissue
c. Bone marrow
d. Thymus
e. A & C

f. A, C, & D

31. Which cells would you expect to find in the light zone of a germinal center that hold antigen for B cells to bind to?
a. Langerhan cells
b. FDCs
c. M cells
d. A&B
e. A,B&C

32. Mature Tcells are longer lived than mature bcells, but will only continue their circulation for 3-4 days in the absence of their specific antigen.
a. True
b. False

33. _____ must compete with each other to gain access to antigen on a FDC.
a. Centrocytes
b. Centroblasts
c. TFH cells
d. A & B
e. A, B & C

34. All of the following are true about antibodies except:
A. They bind with high specificity and affinity
B. They are produced by B-cells in response to infection
C. They circulate as a major component of the plasma in blood and lymph
D. They have the ability to kill pathogens directly

35. What is the most common antibody found in secretions?
A. IgG
B. IgA
C. IgM
D. IgE
E. IgD

36. The enzymes that cut and splice DNA during recombination introduce additional nucleotides that are not encoded in the germ-line DNA.
a. True

b. False

37. Which of the following inflammatory cytokines is paired incorrectly with its role/function?
a. IL-6 : generates a rise in temperature
b. TNF- alpha: leads to an increase in vascular permeability
c. CCL-2 : involved in the recruitment of circulatory monocytes to the infected tissues
d. CXCL-8 : a chemoattractant that guides neutrophils to the site of infection
e. None of the above

38. C-reactive protein and mannose-binding lectin are considered:
a. acute-phase proteins
b. inflammatory cytokines
c. interferons
d. complement receptors
e. None of the above

39. Which of the following pairs of adhesion molecules and their ligands is matched incorrectly?
a. LFA-1 : ICAM-1
b. CTLA4 : B7
c. CD28 : B7
d. CCR7 : CCL21
e. None of the above

40. Antigens that are taken up from the extracellular space will typically be degraded by:
a. a proteasome
b. an endosome
c. TAP-1 & TAP-2
d. an immunoproteasome
e. A & B

41. A TCR can express both alpha:beta and gamma:delta TCR's on its surface.
a. True
b. False

42. MHC I can bind ____ amino acid sequences, while MHC II can bind ____ amino acid sequences
a. 8-10, 10-25
b. 10-25, 8-10

c. 8-10, 10-23
d. 10-23, 8-10

43. Which of the following are true of tapasin?
a. Holds binding groove of MHCII open so only peptides with high affinity can bind
b. Connects MHCII molecule to TAP1/2 so the binding groove is accessible to peptides
c. Aids in the folding of the MHCI molecule
d. A&B
e. A,B&C

44. Mucosal epithelia of the gastrointestinal tract, respiratory, urinary, and genital tracts, and the mammary glands are protected by:
a. Monomeric IgG
b. Pentameric IgM
c. Monomeric IgA
d. Dimeric IgA

45. The evolution of influenza virus that causes relatively mild and limited disease epidemics is referred to as:
a. antigenic shift
b. antigenic drift
c. latency
d. passive immunity

46. How is TCR diversity achieved?
a. Polymorphism
b. Somatic hypermutation
c. Somatic recombination
d. Receptor editing

47. Which of the following statements about influenza is false?
a. Protective immunity is determined by the virus strain from the first exposure.
b. Typically demonstrates an epidemic pattern of infection, which is usually bi-seasonal.
c. Its genome is comprised of 8 DNA molecules.
d. The viral envelope is comprised of two glycoproteins: hemagglutinin & neuraminidase.
e. Antigenic shifts would be expected to occur when a strain of great structural difference emerges into the population.

48. What cell types can use MHCII?
a. Macrophages
b. Monocytes
c. Dendritic cells
d. A&C
e. A,B,&C

49. Identify the statement below that is incorrect about immunological memory.
a. Memory T cells will not be of the same type as they were during the primary immune response.
b. Once a pathogen is cleared, a small population of plasma cells will still secrete pathogen-specific antibody.
c. Effector B cells are expected to outnumber memory cells during a primary immune response, when the pathogen is in high numbers.
d. Memory T and B cells are produced in secondary lymphoid tissue.

50. Mast cells:
a. Release histamine and other active contents from their granules.
b. Kill other cells infected with certain viruses.
c. Arise from the myeloid progenitor.
d. A & C
e. A, B & C