Choose the best possible answer! Questions are 2 points each

1. Which below is an example of an **exogenous** substances and **endogenous** substances?
   a. Morphine ; cocaine
   b. Marijuana ; endocannabinoids (2AG and AEA)
   c. Dopamine ; haloperidol
   d. Glutamate ; GABA

2. There are many routes of administration for any particular drug, which is typically the most rapid while also delivering the highest concentration?
   a. Intravenous infusion
   b. eating
   c. drinking
   d. Subcutaneous

3. What are 5 things that ultimately influence the fate of any substance introduced into the human body?
   a. Action, absorption, binding, inactivation, excretion
   b. Administration, activation, binding, inactivation, excretion
   c. Administration, absorption, binding, inactivation, reuptake
   d. Administration, absorption, binding, inactivation, excretion

**Figure 1 below is for questions 4-6**

4. In figure 1 (above), which drug is the most effective antagonist?
   a. Drug D
   b. Drug A
   c. Drug B
   d. Drug B and A

5. In figure 1 (above), drug “A” shifts to the right this indicates what?
   a. Effective dose has not changed
   b. Tolerance
   c. Sensitization
   d. Dependency
6. In figure 1 (above), Drug “A” shifts to the left as indicated this would be an example of what effect?
   a. Effective dose has not changed
   b. Tolerance
   c. Sensitization
   d. Dependency

7. Which below is a correct example of a competitive antagonist drug treatment?
   a. dopamine ; haloperidol
   b. cocaine ; morphine
   c. Nicotine ; acetylcholine
   d. morphine ; naloxone

8. What is a non-Competitive antagonist?
   a. Are substances that produce inhibitor actions through direct mechanism
   b. Are substances that decrease actions through indirect mechanism
   c. Are substances that produce inhibitor actions over both endogenous and exogenous substances via direct mechanism
   d. Are substances that facilitate endogenous actions of neurotransmitters

9. Drugs or substances can produce 3 basic effects, what are they?
   a. Antagonism, Additive and Potentiation effects
   b. Retroactive, Additive and increased effects
   c. Binding, Antagonism and Potentiation effects
   d. None of the above are correct

10. What is unique about amphetamine compared to cocaine?
    a. Amphetamine drugs bind to dopamine auto-receptors and block dopamine re-uptake mechanisms
    b. Amphetamine drugs cause stereotypic behaviors
    c. Amphetamine drugs increase the release of dopamine and block dopamine re-uptake mechanisms
    d. Amphetamine drugs only block dopamine re-uptake mechanism and increase dopamine retrograde activity

11. True (a) or False (b). Benzodiazepins and barbiturates are sedative drugs that can produce receptor cross tolerance, and can have additive effects, because they both bind to the GABA receptor?

12. The antipsychotic drug haloperidol does what?
    a. Haloperidol is an agonist to Dopamine receptors on the presynaptic neuron
    b. Haloperidol is an antagonist to Dopamine receptors
    c. Haloperidol is an agonist to Dopamine receptors
    d. Haloperidol is an agonist to SHT neurons
13. True (a) or False (b). The end result of the amygdala pain pathway or opiate actions on periaqueductal gray (PAG) neurons in the brain stem is to inhibit incoming pain signals at the level of the spinal cord.

14. Which below is correct about cannabinoid receptors (CB1) in the central nervous system?
   a. CB1 receptors are anterograde post-synaptic receptors
   b. CB1 receptors are post-synaptic receptors that use THC as its endogenous transmitter
   c. CB1 receptors are retrograde activated receptors located on pre-synaptic nerve terminals that have affinity for endogenous endocannabinoids
   d. CB1 receptors are retrograde activated receptors that have no affinity to THC

15. Which is true about substance abuse?
   a. Substance abuse is characterized by excessive use.
   b. It is a cellular change, whereby receptors down regulate from chronic use
   c. It is always characterized by metabolic tolerance
   d. It only occurs in a context where the drug is abused

16. Drug tolerance is the result of decreased susceptibility to a drug that develops as a result of repeated exposure. This often requires a compensatory neural mechanism, whereby a neuron may adjust to repeated drug use?
   a. Cellular tolerance that results in atrophy of neurons that the drug binds to
   b. Alterations in the composition of membrane bond cellular receptors that a neuron uses to reduce (compensate) the effects of a drug (i.e. Tolerance mechanisms)
   c. Cellular changes that takes place in a nerve cell to increase sensitivity
   d. Metabolic alterations that produce an increase in the levers ability to breakdown and inactivate a drug

17. What neural system produces rewarding experiences or participates in reinforcement of particular behaviors.
   a. The medial forebrain bundle where the nucleus accumbens are located
   b. The ventral-Tegmental (VTA) dopamine producing neurons
   c. Dorsal raphe nucleus 5HT neurons that project to the medial prefrontal cortex
   d. Both a and b give rise to a neural system called the mesolimbic system responsible for reinforcement

18. What is the major or primary effector hormone that is ultimately responsible for disorders related to stress?
   a. Dopamine
   b. Norepinephrine
   c. CORT (glucocorticoids or cortisol)
   d. BDNF (Brain derived neurotropic factor)
19. What is one way that stress and CORT is thought to be associated with depression?
   a. High levels of stress and CORT can lead to a decrease in brain derived neurotropic factor (BDNF), thereby leading to neuronal atrophy (cell death)
   b. Basal levels of CORT lead to increased levels of brain derived neurotropic factor (BDNF), which decreases hippocampus neuronal content
   c. High levels of stress block retrieval of memories and limbic function
   d. Both a and b are true

20. What type of receptors are downregulated by serotonin (5HT) selective reuptake inhibitors (SSRIs)?
   a. 5HT reuptake receptors
   b. 5HT auto-receptors
   c. 5HT pre-synaptic receptors
   d. All of the above

21. Ultimately some antidepressants lead to alterations in neuronal function via increasing brain derived neurotropic factor (BDNF), how is this accomplished?
   a. Synaptogenic manipulations
   b. Inactivation of kinases
   c. Increased metabolic rates within neurons
   d. Signal transduction mechanisms

22. Synaptogenesis refers to what?
   a. Increased protein synthesis and synaptic plasticity, which restores synapses and deteriorated neuronal connections
   b. Increased plasticity of neurons in hypothalamic projections to the adrenal cortex to normalize hormonal function
   c. An increase in synaptic activity while decreasing neuronal hyperactivity
   d. None of the above are correct

23. Ketamine rapidly treats depression by facilitating an immediate release of BDNF, as well as facilitating longterm BDNF activity through which mechanistic steps?
   a. Ketamine increases mTOR kinase activity, which leads to decreased BDNF production
   b. Ketamine increases BDNF production via activation of an unknown kinases
   c. Ketamine increases mTOR kinase activity, which leads to increased BDNF production
   d. None of the above are correct

24. Although, neuritic plaques that cause dementia are found throughout the neocortex, these neuritic plaques disrupt in particular which brain area(s)?
   a. Prefrontal insular cortex
   b. Limbic forebrain systems
   c. Temporal lobes
   d. Amygdala complex
25. All anxiety disorders have a similar dysfunctional neural system characterized by hyperactivity in which brain areas?
   a. Locus Coeruleus, cortex (prefrontal specifically), amygdala, thalamus, and hypothalamus
   b. Locus Coeruleus, dorsal raphe nuclei, thalamus and hypothalamus
   c. Amygdala, thalamus, and hypothalamus and GABA interneurons
   d. Amygdala, dorsal raphe nuclei, and thalamus

26. True (a) or False (b). Generalized anxiety disorder (GAD) in particular is characterized by hyper-activation of the periaqueductal grey?

27. True (a) or False (b). In particular post-traumatic-stress-disorder (PTSD) patients have atrophy of neurons in the hippocampus.

28. True (a) or False (b). Panic disorders (PD) have increased activity in the periaqueductal grey (PAG), which produces defensive behaviors like postural freezing?

29. True (a) or False (b). Obsessive compulsive disorders (OCD) are characterized by decreased basal ganglia activity from decreased substantia nigra dopamine neuronal inputs?

30. What is the difference between emotional experience and emotional expression?
   a. Experience is an internal feeling and expression is a behavioral manifestation of that feeling
   b. Experience is an external perception and expression is internal manifestation of that feeling
   c. Experience is an internal feeling and expression is an external feeling
   d. There is no difference

31. How does emotional expression help researchers study the neurobiology of emotions in animals?
   a. It doesn’t help
   b. Animals produce behavioral actions that reflect emotional experience, which we use to relate to neurological activity in the brain.
   c. Emotional expression can never be associated to the emotional state of an animal subject.
   d. Animals can accurately rate subjective feelings via rating scale of 1-10, which we use to relate to neurological activity in the brain. This so effective it is scary, because we are finding out animals hate researchers.

32. True (a) or False (b). James Lang and Cannon Bard theories of emotions are both right and wrong?

33. Animals produce two distinctly different emotions which have clear behavioral manifestations that are convergent with humans?
   a. Anger and Joy
   b. Anger and aggression
   c. Fear and anger
   d. Depression and fear
34. Darwin’s theory of emotions states what?
   a. Emotions are also a development of creationism
   b. Emotions are advantageous overt expressions evolved from behavior that for example, help avoid fighting.
   c. Emotions help an advanced organism engage in disadvantageous behaviors
   d. None of the above

35. What brain areas constitute the Limbic system?
   a. Amygdala, hippocampus. Cingulate cortex, prefrontal cortex, and hypothalamus
   b. All areas listed in (a) but hypothalamus
   c. Both (a) and (b) are incorrect
   d. If your are not sure its answer (a)

36. Destruction (lesioning) of the Amygdala complex in animals results in what behavioral changes?
   a. Increased fear expression and decreased object exploration
   b. Decreased emotional tone of only immediate family members
   c. Increased social exploration and increased fearfulness
   d. Decreased fear behaviors and tendency to repeatedly investigate objects

37. The fear conditioning paradigm I talked about in class involves what?
   a. Association between a previously neutral stimulus (tone) with a threatening stimulus (shock), this requires the amygdala
   b. Association between a previously neutral stimulus (shock) with a threatening stimulus (loud sound), this requires the amygdala
   c. Association between a previously stressful stimulus (shock) with a threatening stimulus (repeated shock), this requires the amygdala
   d. None of the above are true

38. What is a typical response an animal may display when they are fearful
   a. Decreased postural freezing
   b. Increased exploration
   c. Increased grooming behaviors
   d. Increased postural freezing

39. How do we detect stressfully perceived stimuli?
   a. Specific stress receptors that only detect stressful situations
   b. Specific neurotransmitter that are released only to stress
   c. Both (a) and (b) are correct
   d. Largely it the brain is the detector of stress, but evidence indicates specifically activation of limbic system is a requirement
40. What is a current definition of stress?
   a. Is a physiological response to a disruption of homeostasis
   b. Is an alarm system that turns on when homeostasis is disrupted
   c. Is a physiological reaction caused by the perception or detection of aversive or threatening situations that may jeopardize both functions and goals
   d. Both (a) and (b) are correct

41. Which below could be psychological stressor?
   a. Limb fracture
   b. Illnesses caused by infections
   c. Taking an exam that may determine your final grade for a particular class
   d. All of the above

42. The Endocrine response to stress ultimately leads to the secretion of what?
   a. CORT
   b. Epinephrine
   c. Glutamate
   d. Both (a) and (b)

43. Acute stress is good for what?
   a. In general it is an adaptive response that is required to help us appropriately respond to an adverse event or situation
   b. It is a chronic response that helps us adapt to fear
   c. It is a maladaptive response associated with a number of systemic and mental disorders
   d. It is good during a cognitive test like this exam

44. Chronically high CORT levels are bad because?
   a. They produce fear responses
   b. They always lead to aggressive behavior
   c. They are associated with a number of systemic diseases (e.g. Heat disease) and a number of mental disorders (e.g. Depression)
   d. All above are true

45. Novel learning tasks increase CORT secretion which has been shown to facilitate what aspects of learning and memory?
   a. Only Acquisition
   b. Only Consolidation (storage)
   c. Both Acquisition and Retrieval
   d. Both (a) and (b) are true

46. CORT activity in stressful situations can disrupt what aspect of memory?
   a. Acquisition
   b. Consolidation (storage)
   c. Retrieval
   d. Both (b) and (c) are true
47. CORT induced memory failure of a specific memory process is hypothetically dependent on activation of what retrograde signaling system?
   a. Presynaptic auto-receptor regulation
   b. Cannabinoid receptors (CB1) found on the presynaptic neurons
   c. Single transduction inhibition of potassium channels
   d. The mesolimbic system

48. In the Inescapable versus Escapable shock paradigm, which group is yoked?
   a. Escapable to inescapable to control group
   b. Escapable to control group
   c. Inescapable to control group
   d. Escapable to Inescapable group

49. Habituation to stress requires the activation of what?
   a. Dorsal Raphe nucleus
   b. Limbic system
   c. Central nucleus of the amygdala
   d. Medial prefrontal cortex (mPFC)

50. What was the surgical procedure I demonstrated in class that was used to determine which brain area (region) facilitates habituation to stress?
   a. Surgical implantation and micro-infusion of a GABA receptor agonist Muscimol
   b. Surgical implantation and micro-infusion of a GABA receptor antagonist Muscimol
   c. Surgical implantation and micro-infusion of a Glutamate receptor agonist Muscimol
   d. Surgical implantation and micro-infusion of a Glutamate receptor antagonist Muscimol