Select the best answer choice in the questions below.

1. The arrival of chyme containing a mixture of fats, carbohydrates, and proteins into the duodenum over a period of time would cause
   A) an increase in secretin release from the duodenum.
   B) diminished gallbladder contractions.
   C) a decrease in bicarbonate secretion from the pancreas.
   D) a decrease in CCK secretion.
   E) a parasympathetic reflex which would promote gastric contractions.

2. Humans have _____ teats, with _____ openings/teat
   A) 2; 2
   B) 3; 2
   C) 2; 15-27
   D) 2; 7-9
   E) 6; 1

3. During the intestinal phase of gastric regulation:
   A) hormones reduce chief cell activity.
   B) secretin causes more HCl release.
   C) the gastroenteric reflex reduces stomach activity.
   D) the stomach is initially stimulated and later inhibited.
   E) the enterogastric reflex is turned off.

4. The bone-like material that makes up the primary structure of a tooth is
   A) enamel
   B) gingiva
   C) dentinal tubules
   D) cementum
   E) dentin

5. Sympathetic stimulation of the gastrointestinal tract will increase peristalsis and gastric secretions.
   A) True
   B) False

6. Which of the following is developed under the influence of P4 and E2 in the pregnant female?
   A) alveoli
   B) fat pad
   C) lymphatic tissue
   D) teats
   E) primary duct

7. Which regulatory chemical stimulates gastric gland activity and motility?
   A) Vasoactive peptide
   B) Secretin
   C) Gastrin
   D) CCK
   E) Histamine

8. A chorio-vitteline placenta was developed by what order of mammals
   A) monotreme
   B) marsupial
   C) dactylic
   D) eutherian
9. Which of the following is a satiety-stimulating compound produced in the brain?
   A) Ghrelin
   B) NPY
   C) POMC
   D) AgRP
   E) PYY

10. Which of the following is not considered an accessory organ of the digestive system?
    A) salivary glands
    B) liver
    C) pancreas
    D) stomach

11. Which of the following is a characteristic of the large intestine?
    A) It is the site for acid neutralization.
    B) It has villi.
    C) It is longer than the small intestine.
    D) It contains a large number of bacteria.
    E) It provides no absorptive function.

12. When the salivatory nuclei in the brainstem receive neural input from touch and taste receptors in the mouth, salivation is increased.
    A) True
    B) False

13. Which of the following statements concerning the GI tract is false?
    A) The esophagus is lined with stratified squamous epithelium.
    B) The muscle layer of the upper esophagus contains skeletal muscle.
    C) The lower esophageal sphincter is a very thick band of smooth muscle.
    D) The esophageal glands secrete lubricating mucus.

14. The development of what reproductive structure set eutherians off from less developed mammals, such as the koala?
    A) chorio-vitelline placenta
    B) mammary glands
    C) pendulous mammary glands
    D) full placenta
    E) pouches

15. Parietal cells use the enzyme carbonic anhydrase to form the H+ ions in the hydrochloric acid that they secrete.
    A) True
    B) False

16. During the gastric phase ingested food stimulates:
    A) a reflex in the myenteric plexus
    B) a reflex mediated via the vagus nerves and brainstem
    C) an increase in the pH of the stomach contents
    D) all of the above

17. The functions of the liver include all of the following except
    A) secretion of albumin, clotting factors, and other plasma proteins.
    B) storing glucose as glycogen.
    C) producing vitamins A, C and K.
    D) degrading toxins and drugs from the blood.

18. The liver secretes 1,000 mL of bile per day into the duodenum.
    A) True
19. Which of the following does not occur within the large intestine?
   A) synthesis of vitamin K
   B) absorption of water and electrolytes
   C) secretion of mucus
   D) digestion of cellulose by digestive enzymes

20. All of the following are functions of cholecystokinin (CCK) except:
   A) stimulates gallbladder contraction
   B) promotes secretion of pancreatic enzymes
   C) increases gastric HCl production
   D) induces the movement of bile into common bile duct
   E) causes hepatopancreatic sphincter to relax

21. Cows produce _____ of saliva per day
   A) 50 gallons
   B) 50 liters
   C) 100 liters
   D) 150 liters
   E) 200 gallons

22. If an older person is having diarrhea and gas when they try to drink much milk, what enzyme are they not producing on their brush border?
   A) maltase
   B) lactase
   C) carboxypeptidase
   D) gastric lipase
   E) rennin

23. The kidney engages in all of the following activities except:
   A) secreting a hormone which assists in blood pressure regulation
   B) eliminating nitrogenous wastes
   C) secreting a hormone which increases red blood cell production
   D) detoxifying free radicals
   E) secreting a hormone which increases the absorption of glucose from the digestive tract

24. An animal with lesions in this center of the brain will overeat and develop obesity.
   A. medulla
   B. arcuate nucleus
   C. pons
   D. lateral hypothalamus
   E. ventro-medial hypothalamus

25. As urine passes down the collecting duct, water leaves the tube by osmosis and, thus, the urine becomes more and more concentrated.
   A) True
   B) False

26. The concentration gradient that exists from the cortex to the medulla of the kidney is produced by the
   A) loops of the cortical nephrons
   B) proximal convoluted tubules of juxtamedullary nephrons
   C) loops of the juxtamedullary nephrons
   D) distal convoluted tubules of cortical nephrons
   E) collecting ducts of juxtamedullary and cortical nephrons

27. When blood pressure drops, the juxtaglomerular cells of the kidney secrete the enzyme renin, which indirectly results in
   A) a lowering of the mean arterial blood pressure.
B) an increase in the glomerular filtration rate.
C) a loss of sodium.
D) a stimulation of the sense of thirst.

28. All of the following are steps of the rumination cycle EXCEPT
   A) regurgitation
   B) eructation
   C) redeglutition
   D) reinsalivation
   E) remastication

29. The major nitrogenous waste product in humans is:
   A) guanine
   B) ammonia
   C) uric acid
   D) creatinine
   E) urea

30. The most correct sequence of fluid flow through the kidney is:
   A) nephron loop --> glomerular capsule --> proximal convoluted tubules --> distal convoluted tubules -->
      collecting duct
   B) glomerular capsule --> proximal convoluted tubules --> nephron loop --> distal convoluted tubules -->
      collecting duct
   C) proximal convoluted tubules --> distal convoluted tubules --> nephron loop --> glomerular capsule -->
      collecting duct
   D) distal convoluted tubules --> nephron loop --> proximal convoluted tubules --> glomerular capsule -->
      collecting duct
   E) nephron loop --> proximal convoluted tubules --> glomerular capsule --> distal convoluted tubules -->
      collecting duct

31. Should blood pressure rise, one means of renal autoregulation would involve:
   A) constriction of the proximal convoluted tubule
   B) dilation of the afferent arteriole
   C) constriction of the afferent arteriole
   D) constriction of the efferent arteriole
   E) dilation of the proximal convoluted tubule

32. The compartments of the ruminant stomach in order of ingesta passage are
   A) abomasum, reticulum, rumen, omasum
   B) omasum, rumen, reticulum, abomasum
   C) rumen, reticulum, omasum, abomasum
   D) reticulum, rumen, omasum, abomasum
   E) omasum, abomasum, rumen, reticulum

33. As the number of stressors decreases, all other factors being held equal,
   A. intake decreases
   B. intake increases
   C. intake first increases, then decreases
   D. intake first decreases, then increases
   E. intake is a function of feed palatability, and is not correlated to stressors

34. The collecting duct is able to concentrate urine mainly because:
   A) it is permeable to NaCl but not water
   B) it actively transports water
   C) the osmolarity of the extracellular fluid in the medulla is higher than that in the cortex
   D) the permeability of the tubular cells to Na+ increases as the duct passes through the medulla
   E) hydrostatic pressure forces water out of the duct
35. Monogastric salivary glands produce all of the following EXCEPT
   A) mucin
   B) salivary pepsin
   C) saliva
   D) bicarbonate
   E) salivary amylase

36. Gut fill is affected by all of the following, EXCEPT
   A) pelleting
   B) caloric density of the feed
   C) plant tissue lignification
   D) type of CHO ingested
   E) grinding
Essay Topics

Below are 11 sample essay questions. For each, draft the response you would provide on an actual exam. Use key words and topic sentences to make an outline of a potential essay. Make sure to draw any diagrams required. Note: Most of these questions can most easily be answered with a schematic representation accompanied by brief descriptions of the drawn elements. In other words: if it helps – DRAW A PICTURE.

**GI**

**Useful unit knowledge:**
Know about the production, secretion, function of bile salts.
Be familiar with all the hormones involved in digestion. Fill in hormone worksheets on SI website to study.
Know the 3 phases of digestion.
Understand differences in absorptive capacities of stomach, SI, LI.
Understand alcohol metabolism.

1) Describe the process involved in the formation of HCl in the stomach.

2) Trace a piece of steak from its entry in the esophagus, to its absorption in the small intestine. **Be able to do the same for a piece of lard, or a cracker.**

3) Describe the hormonal controls involved in secretion. Include a discussion of bile salt production/excretion in your answer.
4) Compare and contrast the small and large intestines. ***Will not discuss in review. Use the table below to answer.***

<table>
<thead>
<tr>
<th></th>
<th>Small Intestine</th>
<th>Large intestine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sections</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Functions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Absorptive capacity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Length</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Structural modifications present</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motility</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secretions</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Ruminant v Monogastric Digestion.**

**Useful unit knowledge:**

*Know* the amount of saliva produced by cattle, horses.

Be able to list, in order, the steps of the rumination cycle.

Be familiar with the 3 types of ruminants.

1) Compare and contrast the digestive tracts of foregut and hindgut fermenters.

2) Discuss equine digestive physiology with respect to physical and digestive limitations and the management considerations involved. *This is not a course in equine science. Limit your discussion to big points covered in lecture.*

***Will not discuss in review***

Points to consider in answer:
• Unable to vomit or eructate + smaller (relatively) stomach capacity = feed small meals.
• Little to no microbial action in stomach (foregut) = can not supplemen urea (fatal).
• Cecal fermentation = can digest cellulose = can feed hay
  BUT hind-gut = past small intestine = less absorption than in ruminants = feed more highly digestible
  feedstuffs than cattle

Lactation
Useful unit knowledge
Know the number, position, openings for mammary glands of common species. See SI Session 26 worksheet online for
table.

1) Compare and contrast the mammary glands and pertinent reproductive physiology of duck-billed platypus (monotreme),
kangaroo (marsupial), and cow (eutherian). ***Will not discuss in review. Use table below to answer.***

<table>
<thead>
<tr>
<th></th>
<th>Monotreme</th>
<th>Marsupial</th>
<th>Eutherian</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reproduction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internal structures</td>
<td>List them, essentially similar</td>
<td></td>
<td></td>
</tr>
<tr>
<td>External structures</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2) Describe the development of mammary glands, including the hormones involved in each life stage. Use the rodent
element discussed in class. ***Will not discuss in review. Use table below to answer.***

<table>
<thead>
<tr>
<th>Structural development</th>
<th>Hormone(s) Involved</th>
<th>Life stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary ducts and fat pad</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ductal development into fat pad</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extensive duct growth and branching</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Development of lobules and alveoli; attainment of secretory capacity</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3) Why is the mammary gland a gland of reproduction? ***Will not discuss in review***
Points to consider in answer:
• Gland of Reproduction
• Purpose is to nurture young
• Development is tied to hormones and physiology of reproduction.
• Huge female expenditure for something outside their own body
• Develop offspring/ species survival

Appetite Control
Useful unit knowledge
Know the various hormones discussed. Fill in “Hormones/Neuropeptides involved in appetite control” worksheet on SI
website for review.

1) Describe hormonal regulation of hunger and satiety. ***Will not discuss in review. Use table below to answer. Fill in
and use online hormone worksheet.***

<table>
<thead>
<tr>
<th></th>
<th>Hunger</th>
<th>Satiety</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypothalamic center involved</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intestinal hormones involved</td>
<td>Orexigenic hormones, list them</td>
<td>Anorexigenic hormones, list them</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-------------------------------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td>Neuropeptides secreted/inhibited in response to hormones</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Animal Response</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2) Discuss factors involved in intake control of animals (non-hormonal).

Renal
1) Discuss renal autoregulation regulation of glomerular filtration rate.

2) Describe the concentration of urine in the kidneys by tracing the path of filtrate from the glomerulus to the collecting duct.
3) Discuss the renin-angiotensin-aldosterone axis with respect to its role in the regulation of kidney function.