Review questions for Digestive system lecture

Multiple choice review questions

1) Which of the following is part of the digestive system, but not the gastrointestinal tract?
A) liver
B) stomach
C) large intestine
D) small intestine

2) Which of the following is an accessory organ of the digestive system?
A) pancreas
B) small intestine
C) stomach
D) large intestine

3) The circular layer and the longitudinal layer are layers of the ____ layer of the digestive tract.
A) lumen
B) muscularis mucosa
C) submucosa
D) muscularis

4) The _____ is the inner layer of the gastrointestinal tract which functions in absorption and secretion.
A) muscularis
B) serosa
C) submucosa
D) mucosa

5) Regurgitation (or reflux) of stomach contents is normally prevented by the actions of the
A) esophageal sphincter.
B) epiglottis.
C) trachea.
D) glottis.

6) These cells secrete digestive enzyme in the stomach.
A) parietal cells
B) chief cells
C) goblet cells
D) G cells

7) To enter the small intestine, partially digested food must pass through the
A) esophageal sphincter.
B) pyloric sphincter.
C) ileocecal valve.
D) anal sphincter

9) The absorptive surface area of the small intestine is increased by all of the following except
A) villi.
B) microvilli.
C) ruga.

10) The shortest part of the small intestine is the
A) duodenum.
B) jejunum.
C) ileum.
D) cecum.

11) Lactose, salt, or other solutes that increase the osmolarity of the contents of the colon tend to cause
A) acid reflux
B) pyloricstenosis
C) diarrhea.
D) ulcers

16) Glucagon is a hormone secreted by the _____ which promotes _____ of glycogen.
A) Liver; degradation
B) Pancreas; degradation
C) Small intestine; synthesis
D) Stomach; synthesis

18) Uncorrected diabetes mellitus may result in
A) decreased fatty acid utilization by the cells for energy.
B) decreased urine production.
C) dehydration.
D) decreased blood sugar.

19) Insulin promotes all of these effects except the
A) cellular uptake of plasma glucose.
B) synthesis of glycogen (glycogenesis) in the liver.
C) digestion of liver glycogen, releasing free glucose molecules into the blood.

23) Cells can use all of the following as a source of energy except
A) carbon dioxide.
B) glucose.
C) fatty acids.
D) amino acids.

24) Cholesterol is packaged in _____ by the liver for delivery to cells of the body.
A) chylomicrons
B) Fatty acids
C) low-density lipoproteins
D) high-density lipoproteins

25) Basal metabolic rate
A) is increased by physical exercise.
B) is decreased in younger people.
C) can be measured based on oxygen consumption.
D) decreases in an individual with hypothyroidism.

Answers to multiple choice review questions:

1) A
2) A
3) D
4) D
5) A
6) B
7) B
9) C
10) A
11) C
16) B
18) C
19) C
23) A
24) D

Fill-in-the-blank review questions

1) Carbohydrates, proteins, lipids, and nucleic acids are called the four _____; Each is a large molecule that is composed of many smaller molecules called _____.

2) _____ means breaking things down into smaller pieces, such as when macromolecules in foods are broken down into monomers.

3) The digestive system organs fall into two major groups: the _____ and the _____.

4) After being swallowed, ingested food becomes a pasty material known as _____. The gastrointestinal tract is sometimes called the _____.

5) Smooth muscles in the gastrointestinal tract are responsible for propelling chyme from mouth to anus via processes called _____.

6) Smooth muscles in the gastrointestinal tract are also responsible for _____ contractions, which churn and mix the chyme.

7) There are two types of digestion: _____ digestion and _____ digestion.

8) _____ digestion is when digestive juices (such as acids and bile) break apart the chyme through chemical reactions.

9) Although acid and bile play important roles in chemical digestion, the most active molecules made by the digestive system for chemical digestion are proteins called digestive _____.

10) _____ digestion refers to using physical forces to break chyme into smaller parts.

11) One example of mechanical digestion is _____, which takes place in the oral cavity. Another example is _____, which is when the smooth muscle in the GI tract repeatedly contracts on the chyme to break it apart. It is sometimes called "churning".

12) The central hollow area of the gastrointestinal tract is called the _____, the same term that is used to describe the hollow region in many other tubular organs.

13) The GI tract has four major tissue layers. From the lumen outward, the first three are the _____, _____, and the _____.

14) The _____ layer of the gastrointestinal tract is lined with simple columnar epithelial cells. Its two functions are _____ and _____.

15) Most blood vessels and nerve fibers of the GI tract are found in the _____ tissue layer of the GI tract. This layer is made of _____ tissue.

16) The GI tract has a tissue layer of smooth muscle.

a) What is this layer called? _____

b) What are the two functions of this layer?

17) The inner layer of the muscularis externa consists of smooth muscle cells which are oriented in a circle around the lumen and are therefore called the _____ layer of the muscularis externa. This layer is responsible for _____. The outer layer of the muscularis externa has smooth muscle cells are oriented up and down the GI tract and are therefore called the _____ layer of the muscularis externa. It is responsible for _____.

18) The organs of the digestive system which are found in the abdominal cavity are surrounded and cushioned by a _____ membrane, a term that means **any** fluid-filled membrane in the body. The name of the **specific** fluid-filled membrane that surrounds the GI tract is the _____.

19) The sheet-like extensions of the peritoneum which connect the abdominal organs to the abdominal walls are the _____ and the _____.

20) The first section of the GI tract is the oral cavity. After the food in the oral cavity is swallowed, the next section of the GI tract that it moves through is the _____.

21) The _____ is the next section of the GI tract after the pharynx. It is posterior to the trachea (the windpipe). Chyme and beverages do not enter the trachea because the _____, a cartilage flap, blocks the trachea when we swallow.

22) Which GI tract organ passes through the thoracic cavity?

23) In certain regions of the GI tract, the muscles of the muscularis externa form doughnut shaped rings called _____ that are capable of closing to prevent movement of chyme through the tract.

24) As chyme reaches the bottom of the esophagus, the _____ sphincter opens. This sphincter is also known as the _____. It controls the entrance of chyme into the _____ (an organ).

25) The interior of the empty stomach is extremely wrinkled: these wrinkles, or folds, are called _____. These folds increase surface area and allow the stomach to expand and stretch when storing food or drink.

26) The _____ cells of the stomach are responsible for secreting hydrochloric acid.

27) Digestive enzymes in the stomach are secreted by ____ cells.

28*) The stomach and other GI tract organs contain _____ cells which make mucus. The mucus lubricates the passage of chyme and protects the organs from digesting themselves.

29) The stomach's digestive juice (acid and digestive enzymes) is secreted into the lumen of the stomach from microscopic pit-like **inward** folds of its mucosa called _____; their entrances, the _____, appear as microscopic pores on the stomach's interior surface.

30) The _____ cells and _____ cells are the cells that line the gastic glands.

31) Unlike the muscularis externa in other regions of the GI tract, that of the stomach has _____ (a number) of layers

32) A malfunction of the esophageal sphincter causes _____. .

33) After several hours of digestion in the stomach, the _____ sphincter will open to allow passage of chyme out of the stomach and into the _____ (an organ).

34) The most digestion and absorption in the GI tract takes place in the _____ (an organ).

35) The small intestine is divided into three sections. Write the names of the three sections in the blanks below. List them in their correct order.

_____
_____
_____

Circle the one where the most digestion and absorption takes place.

Put a star next to the one where the digestive juices from the accessory glands enter the small intestine.

Put a box around the one that contacts the ileocecal valve.

Draw a triangle next to the one that contacts the pyloric sphincter.

37) The small intestine mucosa has small finger-like projections called _____. These are easily seen using a microscope set at low magnification.

38) The smallest folds in the small intestine are folds of the plasma membranes of the_____ cells of the small intestine mucosa. These folds are called _____ and are so small that they can only be seen using a microscope set at high magnification.

39) The passage of chyme from the small intestine into the large intestine is controlled by the _____ sphincter.

40) Another name for the large intestine is the _____.

41) The major function of the large intestine is absorption of _____ and _____.

42) The large intestine is divided into four regions, the _____ on the right side of the abdomen, the _____ which crosses the abdomen from right to left, the _____on the left side of the abdomen, and the _____ which is the final region before the anus.

43) The _____ is a vestigial organ roughly the size of one's index finger, suspended from the ascending colon.

44) Once chyme has entered the large intestine it is now referred to as _____.

45) The elimination of feces from the gastrointestinal tract is called _____.

46) Bacteria are mostly found in the _____ organ of the digestive system.

47) Overly rapid transit of feces through the large intestine does not allow time for water resaborption; the result is _____.

48) The organs of the GI tract, taken in order, after the mouth, include the _____, _____, _____, _____ and _____, which ends with the anus.

49) Match the descriptions on the right with the GI tract organs on the left. Some descriptions may match more than one organ. Write the letters of all matching descriptions.

Stomach: _____

Small intestine: _____

Large intestine: _____

a) The pyloric sphincter separates it from another organ

b) Most digestion and absorption take place here

c) Has gastric pits

d) The longest organ of the alimentary canal

e) Contains folds called villi

f) The appendix is located at its beginning

g) Contains many bacteria

50) The pancreas is a long, roughly triangular organ located just inferior to the _____ (a GI tract organ).

51) One major function of the pancreas is to make several different _____ (a type of protein), which become mixed with the chyme.

52) Another major function of the pancreas is to make a _____ which is needed because of the high acidity of the chyme that leaves the stomach. This pancreatic substance _____ the acids in the chyme.

54) The digestive juices of the pancreas are secreted into the _____ region of the _____ (an organ).

55) In the blank space after each digestive system structure on the left, write the letters of all descriptions on the right that match it. Some descriptions may match more than one structure. Write the letters of all matching descriptions.

Small intestine: _____	a) Located in the thoracic cavity
Stomach: _____	b) An alimentary canal organ
Esophagus: _____	c) A serosa
Peritonium _____	d) An accessory organ
Pancreas _____	e) Has a sphincter at its entrance

56) The gallbladder stores _____ .

57) The liver is mostly on the left/right (circle one) side of the abdominal cavity.

58) _____ is the digestive juice that is produced by the liver, and which functions to _____ fat globules, a term that means to break apart fat globules into smaller water-soluble globules.

59) Bile is made by the liver mainly from which lipid molecule? _____.

61) Excessively high concentrations of bile in the blood (such as can occur when the liver is diseased) can cause an abnormal yellow skin color called _____.

62) The two organs that produce the most digestive enzymes are the _____ organ and the _____ organ.

63) Below is a partial list of digestive system structures. Write an A in the blank next to all parts that are accessory organs. Write a G in the blank for all that are parts of the GI tract. Also write a number in the blank next to all GI tract parts to indicate the correct order that chyme passes through them.

Large intestine: _____
Oral cavity_____
Stomach_____
Esophageal sphincter_____
Pancreas_____
Duodenum_____
Liver_____
Gall bladder_____

64) Triglycerides (fats and oils) in foods are digested by enzymes into _____ and _____ molecules.

65) Large carbohydrates are called polysaccharides. They are polymers of the monosaccharide _____.

66) When a large carbohydrate molecule, such as starch, is eaten, the first digestive enzyme breaks it down into _____, which is a carbohydrate made of two glucose sugars linked together.

67) The polysaccharide from plants that provides most of our calories is called _____. Major sources are potatoes, bread, pasta, and rice. The polysaccharide our bodies make and store in our liver and muscles is called _____.

68) One of the major reasons we eat is to provide "fuel" molecules (such as glucose) for our cells. Our cells usually use a process called cellular aerobic respiration to convert the energy in fuel molecules into cellular energy. Write the complete chemical reaction of cellular aerobic respiration of one molecule of glucose. Include all reactant and product molecules in the chemical reaction.

69) Cellular aerobic respiration is used to recharge the cell's supply of an energy-rich molecule inside the cell. Name that energy-rich molecule: _____ (hints: It is not glucose. The molecule is the direct energy source that powers the cell's proteins).

70) We lack enzymes to digest cellulose, a plant carbohydrate abundant in stems and leaves. When eaten, cellulose ends up in the feces, undigested. On food labels, cellulose molecules are referred to as _____ or _____.

71) Although we cannot digest fiber, it benefits use in two ways. It lowers the level of _____ (a lipid found in the blood) and it also lowers the risk of _____ (an organ) cancer.

72) “Fiber” or “bran” are terms for cellulose, a plant carbohydrate that the body is not able to digest. You are a fiber molecule (yes, you are). Make a numbered list of the parts of the alimentary canal (in the correct order) you pass through starting with the oral cavity and ending with the anus. Include all sphincters, tubes, and the sub-sections of major organs (if the organ is divided into sub-sections) that you pass through. Do not include organs that you do not pass through.

73) Once absorbed from the GI tract, many glucose molecules are transported to the _____ organ for storage.

74) The endocrine (hormone secreting) portion of the pancreas consists of clusters of cells. These cluster are called _____ or _____.

75) The pancreatic islets contain two kinds of cells: cells which secrete the hormone _____, and cells which secrete the hormone _____.

76) Most cells respond to insulin by taking in blood glucose for energy, but one major organ responds to insulin by storing the blood glucose as glycogen. This organ is the _____.

77) The hormone from the pancreas that raises the plasma glucose concentrations, such as during periods of fasting, or starving is called _____.

78) Glucagon is secreted in response to low/high (circle one) glucose in the blood, and its major target is the _____ (an organ).

79) In response to glucagon, the liver does _____, which increases the glucose concentration in the blood.

80) Fill in the blanks in the following paragraphs. Be as specific as possible in your answers.

> If you ate a meal consisting of pasta and potatoes, the major macromolecule nutrient you are consuming is _____. This nutrient will first be broken down by an enzyme into the disaccharide _____, then another enzyme will digest the disaccharides into the monosaccharide _____.
>
> The monosaccharide will travel in the hepatic portal vein to the _____ (an organ), which will store it in the form of a polysaccharide known as _____. When blood sugar levels are low (such as between meals) the liver breaks down the polysaccharide into the monomer _____ to keep your blood sugar levels from declining.

81) Blood glucose levels stay more or less constant (at around 70-100 mg/100 ml). This steady level of glucose is maintained mainly by two hormones with opposing effects. For the hormone that is secreted **<u>just after</u>** a carbohydrate-rich meal is eaten, answer the following questions:

a) Hormone name: _____
b) Which organ secretes this hormone? _____
c) Name the region within this organ that secretes the hormone: _____
e) The hormone raises/lowers (circle one) blood sugar.
f) What is the target organ/tissue of the hormone? _____
g) What is the response of the target organ/tissue to the hormone?
_____

82) Blood glucose levels stay more or less constant (at around 70-100 mg/100 ml). This steady level of glucose is maintained mainly by two hormones with opposing effects. For the hormone that is secreted between meals (**<u>many hours after</u>** the last meal is eaten) answer the following questions:

a) Hormone name: _____
b) Which organ secretes this hormone? _____
c*) Name the region within this organ that secretes the hormone: _____
e) This hormone raises/lowers (circle one) blood sugar.
f) What is the target organ/tissue of the hormone? _____
g) What is the response of the target organ/tissue to the hormone?
_____

83) The major three symptoms of uncontrolled diabetes are _____, _____, and _____.

84) Diabetes mellitus results from the inadequate secretion or action of the hormone _____.

94) _____ molecules (which is the correct term for fat and oil molecules) are digested into into _____ and _____ molecules.

95) _____ are fatty acids, or fats containing fatty acids, which do not contain any double bonds between their carbon atoms. These are considered less healthy fats.

96) _____ are fatty acids which contain one or more double bonds between their carbon atoms. These are considered more healthy fats.

97) Cholesterol and fats in the bloodstream, since they are not soluble in water, do not simply float freely: instead they are bound to proteins and surrounded by polar phospholipids. These fat-protein combinations are called _____.

98) There are two types of lipoproteins: _____ lipoproteins (abbreviated as _____) and _____ lipoproteins (abbreviated as _____).

99) LDLs carry cholesterol and other lipids from the _____ to the _____, where they will be used in membranes and to make steroid hormones.

100) HDLs carry cholesterol and other lipids from the _____ to the _____ where they will be converted into bile.

101) What are the three major macromolecule nutrients?

_____
_____
_____

Circle the one that is more healthy to get from animals (than plants)

Box the one that is less healthy to get from animals (than plants)

Put a star around the one that is supposed to be our major source of calories

102) Below is a list of factors that can change the metabolic rate (the calories expended per hour by the body). In the blank space after each factor, write I if it is associated with increased metabolic rate, and write D if it is associated with decreased metabolic rate.

a) Thyroxin_____

b) Being male_____

c) Being elderly_____

d) Being a large person_____

e) Exercising_____

103) The main substance that controls basal metabolic rate is _____.

104) Although there are hundreds of different weight-loss diet plans, weight loss can only be achieved by _____, which decreases the amount of energy brought into the body, or by _____, which raises the amount of energy the body expends, or both together.

Answers to fill-in-the-blank review questions:

1) Macromolecules
   Monomers
2) Digestion
3) Gastrointestinal tract organs
   Accessory organs
4) Chyme
   Alimentary canal
5) Peristalsis
6) Segmentation
7) Mechanical
   Chemical
8) Chemical
9) Enzymes
10) Mechanical
11) Chewing/mastication
   Segmentation
12) Lumen
13) Mucosa
   Submucosa
   Muscularis externa
14) Mucosa
   Secretion
   Absorption
15) Submucosa
   Dense connective tissue
16) a) Muscularis externa
   b) Peristalsis and segmentation
17) Circular
   Segmentation
   Longitudinal
   Peristalsis
18) Serosa
   Peritoneum
19) Mesenteries and omentum
20) Pharynx
21) Esophagus
   Epiglottis
22) Esophagus
23) Sphincters
24) Esophageal
   Cardiac
   Stomach
25) Rugae
26) Parietal
27) Chief
29) Gastric glands
   Gastric pits
30) Parietal
   Chief
31) Three
32) Acid reflex/Heartburn
33) Pyloric
   Small intestine
34) Small intestine
35) Duodenum (star, triangle)
   Jejunum (circled)
   Ileum (boxed)
37) Villi
38) Epithelial/Mucosa
   Microvilli
39) Ileocecal
40) Colon
41) Water
   Ions
42) Ascending colon
   Transverse colon
   Descending colon
   Sigmoidal colon
43) Appendix
44) Feces
45) Defecation
46) Large intestine
47) Diarrhea
48) Pharynx
   Esophagus
   Stomach
   Small intestine
   Large intestine

49) A, C
   A, B, D, E
   F, G

50) Stomach
51) Digestive enzymes

52) Buffer
   Neutralizes

54) Duodenum
Small intestine
55) B, E
B, E
A, B
C
D
56) Bile
57) Right
58) Bile
Emulsify
59) Cholesterol
61) Jaundice
62) Pancreas
Small intestine
63) G5
G1
G3
G2
A
G4
A
A

64) Glycerol
Fatty acids
65) Glucose
66) Maltose (a disaccharide)
67) Starch
Glycogen
68) $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$
69) ATP
70) Fiber
Bran
71) Cholesterol
Colon cancer

72) Oral cavity
Pharynx
Esophagus
Esophageal sphincter
Stomach
Pyloric sphincter
Duodenum
Jejunum
Ileum
Ileocecal valve
Ascending colon
Transverse colon
Descending colon
Sigmoidal colon
Rectum
Anus
73) Liver
74) Pancreatic islets
Islets of Langerhans
75) Glucagon
Insulin
76) Liver
77) Glucagon
78) Low
Liver
79) Glycogenolysis (breaks glycogen into glucose monomers)
80) Starch
Maltose
Glucose
Liver
Glycogen
Glucose
81) a) Insulin
b) Pancreas
c*) Islets of Langerhans/Pancreatic islets
e) Lowers
f) All cells, tissues, and organs
g) Take in glucose from the blood

82) a) Glucagon
b) Pancreas
c*) Islets of Langerhans/Pancreatic islets
e) Raises
f) The liver
g) Glycogenolysis
83) High blood sugar
Sugar in urine

Large frequency and volume of urine

84) Insulin

94) Triglyceride

Glycerol

Fatty acid

95) Saturated

96) Unsaturated

97) Lipoproteins

98) High density

HDL

Low density

LDL

99) Liver

Cells

100) Cells

Liver

101) Carbohydrates (star)

Proteins (circled)

Lipids (boxed)

102) I

I

D

D

I

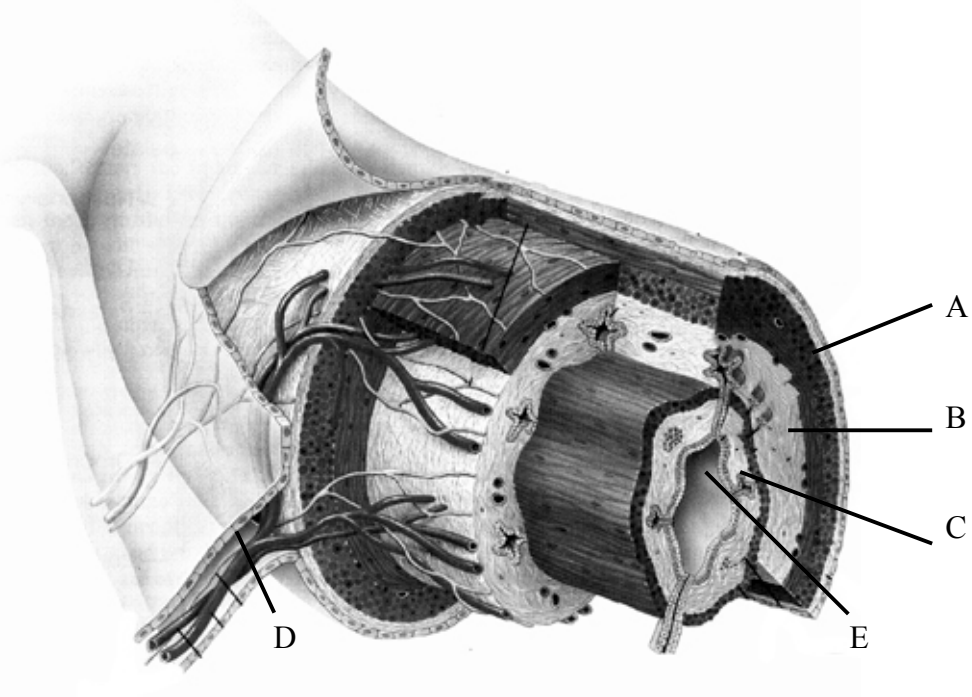
103) Thyroxin

104) Eating fewer calories

Exercising/Increasing calories burned

Short answer review questions:

Problem 1) A cross section of the GI tract is shown below. After each letter below the drawing, give each part's name, its tissue type, and its function. (For part E, just give its name and function).



A: *Hint: Churns chyme*
B: *Hint: Contains blood vessels and nerves*
C: *Hint: Innermost tissue layer*
D: *Hint:Cushions the GI tract*
E: *Hint: The hollow space inside*

2) Describe the tissue type, location, and function of the pyloric sphincter:

3) List the cells of the stomach mucosa and what they secrete:

4) Name and describe all structures that increase the surface area of the small intestine:

5) What substances are absorbed by the large intestine mucosa?

6) Explain the function of buffer in pancreatic juice.

7) The drawing below represents the digestion of a large nutrient macromolecule in the digestive system. Each circle represents one monomer molecule. The arrow represents a digestive enzyme.

a) The product molecules of this reaction will/will not (circle one) be absorbed into the body.

b) Justify your answer to question (a).

c) If the circles represent amino acids, the proper term for the molecule on the left is a _____ and the proper term for the molecules on the right is _____.

c) Person X eats a starchy meal (like pasta). Person Z eats a meal with lots of table sugar (sucrose). Which person's blood sugar will increase faster? _____ Justify your answer using concepts about how digestion of food molecules is carried out by enzymes.

8) The nutrient monomers that are absorbed into the body by the digestive system (such as monosaccharides, amino acids, and fatty acids) serve two major purposes. What are those two purposes? In other words, why do we need to eat?

9) Explain how the liver helps maintain a constant blood glucose concentration:

10) Explain how the liver provides cholesterol to cells throughout the body:

11) Explain how the liver removes excess cholesterol from the body

12) Name the endocrine structures of the pancreas and list the names and actions of the hormones they secrete.

13) Describe the steps involved in the digestion of fat and oil.

14) The table below lists the three major macromolecule nutrients on the top row and some traits on the left hand column. Fill in the table.

	Protein	Carbohydrates	Fats
It is first digested into a smaller molecules called	_____	_____	_____
It is then digested into monomers called	_____	_____	_____
Are its monomers a major cell energy source? (Yes/No)	_____	_____	_____

Answers to short answer review questions:

1) A = Muscularis externa; smooth muscle tissue; propels chyme through GI tract (peristalsis) and churns chyme within GI tract (segmentation)

B = Submucosa; dense connective tissue; supports mucosa, contains blood vessels to carry away absorbed nutrients, and contains nerves to sense chyme and control smooth muscles.

C = Mucosa; simple columnar epithelial tissue; secretes digestive juices and absorbs nutrient monomers and water.

D = Peritonium; a serosa (a fluid-filled membrane of epithelial and connective tissue); surrounds, cushions, and protects the GI tract organs.

E = Lumen; Hollow space for chyme

2) The pyloric sphincter is a donut-shaped ring of smooth muscle tissue. It acts as a valve that controls the flow of chyme from the exit of the stomach to the entrance of the small intestine. It opens only briefly so that the small intestine is not damaged by large volumes of acidic chyme.

3) Chief cells = Make a digestive enzyme.
Parietal cells = Make hydrochloric acid

4) Villi = Finger-shaped folds of the mucosa can be seen at low microscopic magnification.

Microvilli = Finger-shaped folds of the cell membranes of epithelial cells of the mucosa. Microvilli can be seen at high microscope magnification.

5) Water, ions, and some vitamins.

6) The buffer from the pancreas neutralizes the acid chyme which enters the small intestine from the stomach.

7) a) Will not.
b) In general, only monomer molecules can be absorbed into the body from the GI tract. The product molecules shown in the diagram are not monomers (they are polymers: Monomers linked together). The product molecules will require further digestion into monomers before they can be absorbed into the body.
c) Protein, Peptides

8) The monomers are used for two purposes: (1) As fuel molecules to provide energy for our cells, or (2) As monomers for the construction of our own macromolecules (such as proteins, polysaccharides, triglyceride lipids, and nucleic acids).
9) The liver lowers blood glucose when glucose is high. The liver lowers blood glucose by absorbing it from the blood and storing it in the form of a glucose polymer called glycogen.

The liver raises blood glucose when glucose is low. The liver raises blood glucose by degrading the glycogen into individual glucose molecules then releasing them into the blood.

10) The liver manufactures cholesterol and packages it with proteins into spheres called low density lipoproteins (LDLs). The liver releases LDLs into the blood so that cholesterol is available to all cells that require it.

11) When cells of the body have too much cholesterol, the cells package it with proteins into spheres called high density lipoproteins (HDLs). The cells release the HDLs into the blood. The liver receives the HDLs and uses the cholesterol as a main ingredient in the manufacturing of bile. The bile secreted by the liver enters the GI tract (where it is used to emulsify fats) and exits the body in the feces.

12) The pancreatic islet (also known as islets of Langerhans) are the endocrine structures of the pancreas. These structures contain beta cells that release the hormone insulin when blood glucose is high. Insulin signals all cells of the body to take in glucose from the blood. The islets also contain alpha cells that release the hormone glucagon when blood sugar is low. Glucagon signals the cells of the liver to release glucose into the blood.

13) Fats and oils aretriglyceride molecules. They are hydrophobic and therefore they don't dissolve in water. Instead, they form ball-shaped "fat globules" in the GI tract. The first step in fat digestion is for bile to emulsify the fat globules into much smaller globules that are small enough to disperse in the

watery chyme. The second step of fat digestion is for the enzyme lipase to digest the triglyceride molecules into fatty acids and glycerol. The fatty acids and glycerol are absorbed into the body.

14)	Protein	Carbohydrates	Fats
It is first digested into a smaller molecules called	Peptides	Disaccharides	Triglycerides
It is then digested into monomers called	Amino acids	Monosaccharides	Glycerol and fatty acids
Are its monomers a major cell energy source? (Yes/No)	No	Yes	Yes