1. Lists the major contents of pancreatic secretions.
   a. Enzymes
   b. Bicarbonate rich fluid
   c. Ions (Na⁺, Cl⁻, HCO₃⁻)
      i. At low secretory rate, Cl-
      ii. At high rate, HCO₃⁻
2. Describes the mechanisms by which chyme is neutralized in the duodenum.
   a. Bicarbonate from CO₂ or Na⁺/HCO₃⁻ cotransporter into duct cell
   b. Cells transport HCO₃⁻ into lumen and H⁺ to the blood
   c. Na⁺/H⁺ exchanger also sends H⁺ out to blood
   d. Secretin can cause H⁺ ATPase to be implanted in membrane
   e. CFTR ion channel (Cl⁻/HCO₃⁻ out) or Cl⁻/HCO₃⁻ exchanger sends HCO₃⁻ into lumen
   f. CFTR channel activated by cAMP produced in response to secretin bound to basolateral membrane (adenylyl cyclase)
3. Describes the mechanism by which pancreatic zymogens are activated in the small intestine.
   a. Synthesis on polysomes and transfer to RER
   b. Protein modification in RER
   c. Transfer to Golgi complex
   d. Modification and sorting in Golgi and condensation in vacuoles
   e. Vacuoles condense to form zymogen granules
   f. Regulated exocytosis or constitutive secretion
   g. In small intestine, proenzymes are cleaved by trypsin to be activated
      i. Enterokinase and trypsin responsible for activation of trypsinogen -->trypsin
      ii. Most pancreatic enzymes are proenzymes w/ exception of amylase, lipases
      iii. Multiple forms of enzymes relates to specificity
4. States the stimuli that release secretin.: low pH
5. States the stimuli that release CCK.
   a. Fat
   b. Peptides and AA
6. States the effects of secretin and CCK on pancreatic secretion.
   a. Secretin acts on duct cells to release HCO₃⁻
   b. CCK acts on acinar cells to increase enzyme secretion
   c. CCK has potentiating effect on duct cells
   d. CCK can also excite vagal afferents to neurally stimulate acinar cells (important in humans)
7. Identifies the intracellular mediators of secretin and CCK action.
   a. Secretin acts on adenylyl cyclase --> PKA activation
   b. CCK acts on PLC --> IP₃ + DAG
   c. IP₃ stimulates release of Ca²⁺ from intracellular stores and Ca²⁺ influx
      i. Calmodulin activated PP, PK
      ii. Ca²⁺ activated PK-C
   d. DAG activates PKC
8. Describes the role of CFTR in pancreatic ductular secretion.
   a. See 2e and f
9. States the significance of the potentiating interaction of CCK and secretin on pancreatic secretions.
   a. See 6
10. States the effects of the autonomic nerves to the pancreas on pancreatic secretion.
    a. Vagal efferents release ACh to both acinar and duct cells
    b. ACh acts to activate PLC cascade