

Name: \_\_\_\_\_

**Biological Sciences 4087**

**Exam III**

**11/17/10**

**Total: 100 points There are 5 pages and 12 question on this exam. Question 12 is an essay question.**

**1.(14pts)** Fill in the blanks.

**A.** Metformin (used to treat type 2 diabetes mellitus) inhibits the synthesis of phosphoenolpyruvate carboxykinase and glucose-6-phosphatase. These enzymes are part of the pathway (name the pathway):

\_\_\_\_\_

**B.** The insulin receptor directly phosphorylates the protein (do not name the receptor itself):

\_\_\_\_\_

**C.** Nitric oxide (NO) is made from the amino acid \_\_\_\_\_

**D.** An SH2 domain in a protein binds to \_\_\_\_\_

**E.** The enzyme that hydrolyzes and inactivates cGMP is

\_\_\_\_\_

**F.** The ErbB protein is a truncated form of the protein

\_\_\_\_\_

**G.** In the insulin receptor signaling pathway, Ras is directly activated by the protein

\_\_\_\_\_

**2.(2pts)** Name 2 noncarbohydrate precursors that can be used to synthesize glucose in the liver. (Name 2 different precursors.)

\_\_\_\_\_

**3.(2pts)** Name a pathway that produces NADPH in animals.

\_\_\_\_\_

**4.(14pts)** Write out the pathway for glycolysis from glucose to pyruvate. Indicate the products of glycolysis and where they are formed. Label the steps catalyzed by regulatory enzymes and name those enzymes.

**5.(4pts)** What is the function of each of the following in glycogen metabolism? Be specific.

**A.** UDP-glucose pyrophosphorylase-

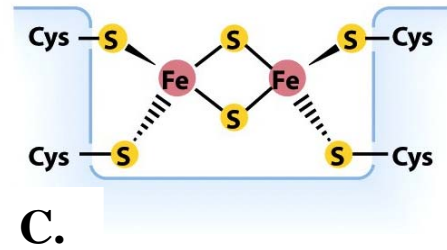
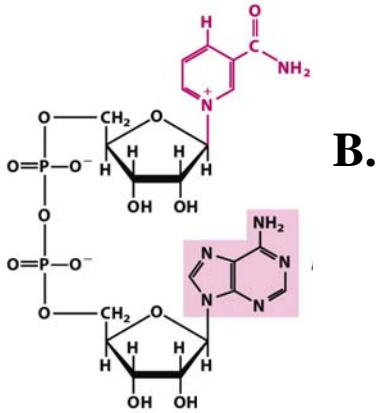
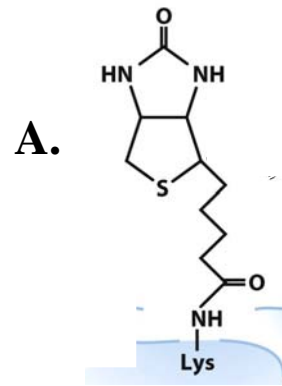
**B.** glycogenin-

6.(9pts) Identify (Write out the complete names):

A. \_\_\_\_\_

B. \_\_\_\_\_

C. \_\_\_\_\_



7.(9pts) A. Write out the complete pathway for the stimulation of glycogen degradation by the hormone glucagon in liver. Begin with the hormone's receptor.

B. Name an allosteric effector for the regulatory enzyme for glycogen degradation in liver and describe its effect on the enzyme.

**8.(9pts) A.** Write out the reaction catalyzed by the pyruvate dehydrogenase complex.

**B.** Name the 3 cofactors of the pyruvate dehydrogenase complex. Write out the complete names.

\_\_\_\_\_

\_\_\_\_\_

**9.(12pts)** Fill in the blanks regarding fatty acid metabolism.

**A.** The protein surrounding the lipid droplet in adipocytes is \_\_\_\_\_.

**B.** Glycerol enters glycolysis/gluconeogenesis by being converted to the glycolytic intermediate (write out the complete name)

\_\_\_\_\_

**C.** Fatty acids are transported into mitochondria attached to

\_\_\_\_\_

**D.** Each round of fatty acid  $\beta$  oxidation produces \_\_\_\_\_,

\_\_\_\_\_, and \_\_\_\_\_

**E.** Coenzyme B<sub>12</sub> is needed to convert propionyl CoA to the citric acid cycle intermediate

\_\_\_\_\_

**F.** An example of a ketone body is \_\_\_\_\_.

**10.(7pts)** Write out the pathway for mitochondrial electron transport from NADH to O<sub>2</sub>. Write out the complete name of the complexes (not just the numbers).

**11.(10pts)** Fill in the blanks (write out the complete names):

**A.** In the urea cycle, argininosuccinate is cleaved to \_\_\_\_\_

and \_\_\_\_\_.

**B.** The prosthetic group of aminotransferases is \_\_\_\_\_.

**C.** The amino acid \_\_\_\_\_ is degraded to fumarate.

**D.** One of the nitrogens of urea is supplied by the amino acid \_\_\_\_\_.

**E.** A deficiency in phenylalanine hydroxylase results in the genetic disease

\_\_\_\_\_

**12.(8pts)** HIF-1 is produced under low oxygen conditions in tissue. Discuss the effects of HIF-1 on metabolic pathways in the hypoxic tissue.