BIOC 300A Fall 2015
Practice Exam 2

INSTRUCTOR: Dr. D. Briant

COMPLETE THIS EXAM AT HOME.
WEDNESDAY'S LECTURE (NOV. 18) WILL BE DEDICATED TO REVIEWING THE EXAM

30 MARKS TOTAL
1 HOUR

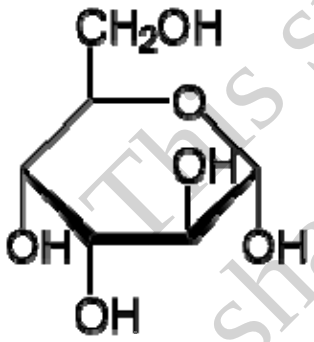
1. "Economy class syndrome" was a name given to a condition where people on airplanes developed potentially fatal blood clots. Based on our discussions of thrombin in class,can you make a prediction about how this medical condition may arise? ***(3 marks)***

About blood clotting pathway. Master regulator of blood clots Thrombin. Initiates clotting. Proteolytic activation. Lack of circulation. One activated thrombin: chain reaction.

2. From an energetic point of view, why does the cell use protein phosphatases rather than have protein kinases catalyze the reverse reaction? ***(2 marks)***

Kinase - phosphorylates protein using ATP -> ADP + phosphorylated protein.
Phosphatase - hydrolysis: P(something) + H2O -> P + (something)
Because reserve reaction for a kinase is pretty improbable.

3. The sugar below is a D-altropyranose.Which anomeric form is this molecule? Draw a Fischer projection of the linear form of the sugar. On the Haworth projection, circle the carbon that determines whether the carbohydrate is in the D or L conformation. ***(4 marks)***



4. In EcoRV, what is the role of the metal ion? ***(2 marks)***

Activated H2O as a nucleophile

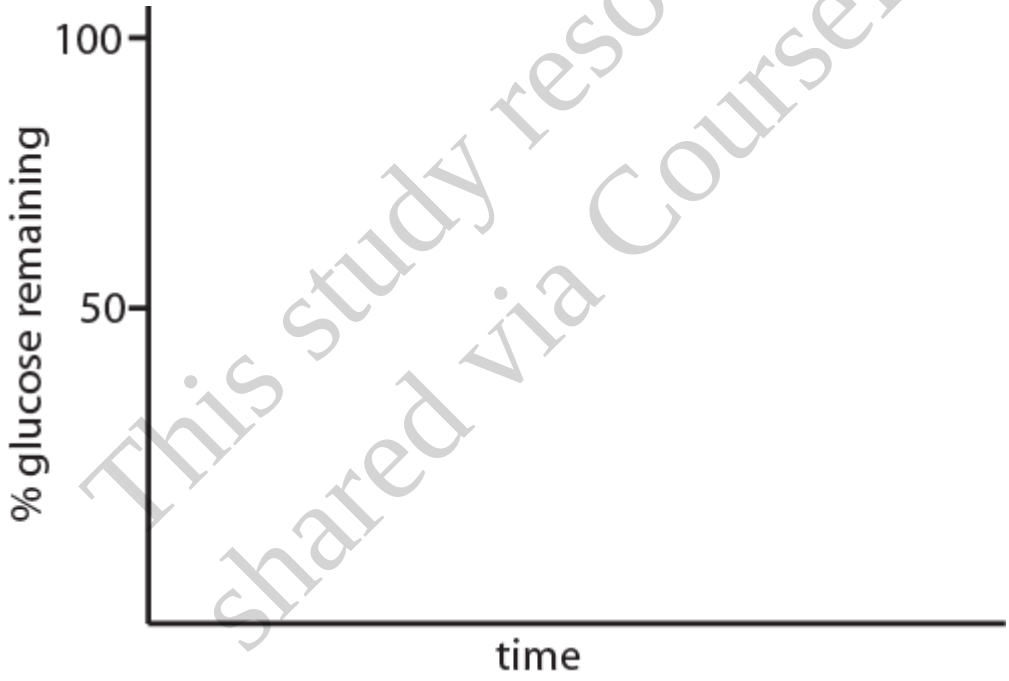
5. Why are N-linked glycoproteins always linked via asparagine, and never glutamine? ***(2 marks)***

How are N-linked glycoproteins made. Oligosaccharide Transferases: does not recognize glutamate. Very specific.

6. When discussing carbonic anhydrase, we discussed how the pKa of water is 15.7. Show calculations to describe how this is derived. ***(3 marks)***

Ka = [H+][OH]/[H20] = (1x10^-14)/55.5
pKa = -105 Ka
= 15.7

7. An enzyme recognizes and utilizes only the α anomer of glucopyranose. The glucose is consumed in the reaction. Draw a chart with % glucose remaining on the y axis and time on the x axis for a reaction that <u>starts</u> with pure non-cyclized glucose and <u>ends</u> with the reaction reaching equilibrium. Briefly explain the graph. ***(4 marks)***



8. List one advantage of proteolytic activation over phosphorylation, and one disadvantage of proteolytic activation over phosphorylation. ***(2marks)***

Advantage: no ATP needed and activate extracellularly.
Disadvantage: irreversible and mutate master regulator

9. We discussed two isoforms of lactate dehydrogenase and the reaction that they catalyze. Describe the cellular conditions each isoform functions in, and draw the main reaction that each isoform catalyzes (substrates and products) prior to equilibrium. ***(4 marks)***

H - heart - aerobic = lactate - pyruvate
M- muscle - anaerobic = pyruvate - lactate

10. How do isoforms contribute to the incredible diversity of substrates that PP2A can recognize? ***(2 marks)***

11. In the initial studies that separated the catalytic and regulatory subunits of aspartate transcarbamoylase, it would still have been technically possible for the enzyme to maintain cooperativity. Briefly explain why. ***(2 marks)***

END OF EXAM