Transient changes in extracellular glucose and insulin concentrations following sudden changes in glucose intake under two different conditions: (b) when the control system is not functioning, and (a) when it is functioning.

1) The figure shows the results of an experiment with the glucose regulation system: (a) normal and intact; (b) disabled and without control. Assume that the constant infusion is 20 grams per hour.

i) determine the D.C. loop gain of the system.

ii) The outputs a and b, in terms deviation from normal, are taken from the graph

$$C(t) = 10 + 60e^{-t/0.77} - 70e^{-t/0.33} \text{ mg/dL (a)}$$

and

$$C(t) = 70(1 - e^{-t/0.77}) \text{ mg/dL (b)}$$

One form of glucose tolerance test requires ingestion of 100g of glucose over a very short period. Determine the response of both the intact and the uncontrolled system to this test. Write the equation for C(t) and carefully plot its values over 0 ≤ t ≤ 5 hours (for both a and b).

Does a normal system exhibit reactive hypoglycemia? If a person cannot drink 100g glucose immediately, but spreads it out over 1.0 hour, will the test show reactive hypoglycemia?