All answers need to be written in a clear, succinct manner. Write a brief paragraph summarizing the answers to the problems with each answer clearly stated in a sentence. Supporting graphs should be provided when asked for, but you should not include printouts of spreadsheets. You can create an appendix to a problem, but that should only include significant material to back up your answers.

1. Work the diabetes problems in WeBWorK, including written work and graphs in your assignment.

2. According to a famous diabetologist, the blood glucose concentration of a nondiabetic who has just absorbed a large amount of glucose will be at or below fasting level in 2 hours or less.

   a. The deviation $g(t)$ of a patient’s blood glucose concentration from its optimal concentration satisfies:
   $$\frac{d^2 g}{dt^2} + 2\alpha \frac{dg}{dt} + \alpha^2 g = 0,$$
   immediately following absorption of a large amount of glucose, where $t$ is in minutes. Show that this patient is normal according to Ackerman et al, if $\alpha > \pi/120$ (min), and that this patient is normal according to the famous diabetologist if
   $$g'(0) < -\left(\frac{1}{120} + \alpha\right) g(0).$$

   b. Suppose that a patient’s blood glucose concentration $G(t)$ satisfies the initial value problem:
   $$\frac{d^2 G}{dt^2} + 0.05 \frac{dG}{dt} + 0.0004G = 0.03,$$
   $$G(0) = 150 (\text{mg glucose}/100 \text{ ml blood})$$
   $$G'(0) = -\alpha G(0)/(\text{min}); \quad \alpha > 0.02042$$
   immediately after fully absorbing a large amount of glucose. Is this patient diabetic according to Ackerman et al? Explain. Is this patient diabetic according to the diabetologist? Explain.
