Math 152 – Sample Exam 1 Brief Answers – Spring 2016 – Louis Gross

1. (a) -1/2 (b) 7/2 (c) -2 (d) 5/2 (e) 12 (f) 1/12 (g) Doesn't Exist

2. P=27 is the horizontal asymptote and this represents the photosynthetic rate in μmol CO_2 m^{-2} s^{-1} of this soybean plant that would occur at very high light levels.

3. There are many possible choices for this – some possible answers are

$$f(x) = \frac{1}{x-2} \qquad g(x) = \ln(x\text{-}2) \qquad h(x) = \begin{cases} x^2 \, for \ x \le 2 \\ x \ for \ x > 2 \end{cases}$$

4. (a) f(x) is continuous on $(-\infty, -1) \cup (-1, \infty)$

   (b) g(x) is continuous $(-\infty, 0) \cup (0, \frac{1}{2}) \cup (\frac{1}{2}, \infty)$

5. (a) 687 g   (b) Not continuous because it jumps at t=28 days (c) Possibly because the growth of a chicken shifts when it reaches a certain age and the physiological growth processes for young chickens are not the same as for older ones. It also is possible that this equation arose just from looking at data and is a fit to the data which changed form in the fit at 28 days.

6. 300 g/month

7. If we average the rate of change just before and just after the time then for t=1 we get -44 mg/ml/hr and at t4 we get -18.5 mg/ml/hr

8. (a) this means that a mouse that consumes 200 calories gains 3 g of weight that day
   (b) this means that for a caloric intake of 120 calories the rate of change of body weight change is zero – so at 120 calories the rate at which body weight is changing over a day per calorie consumed is 0
   (c) g/day/cal

9. (a) Over a full day the change is M(24) – M(0) = 58 – 10 =48 g O_2 /minute/day
   (b) If we take the average change for 1 hour before t=6 and 1 hour after 6 we get 262-238 + 238-210 =28 g O_2 /minute/day

10. One example of this is the function $f(x) = |x - a|$