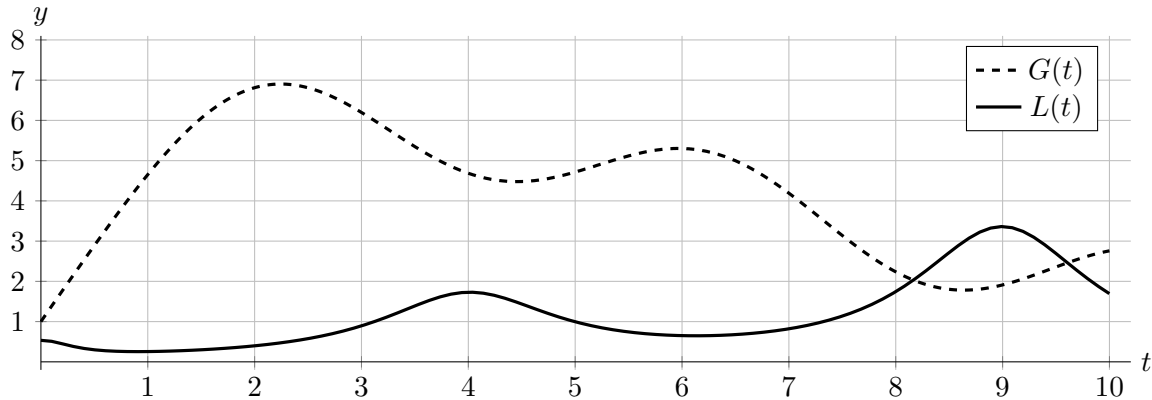


3. [10 points] Television ratings for the popular sport of pigglystick have been fluctuating wildly this fall, ever since mega popstar Becky Twist started dating one of the sport's premier players. Becky's fans ("Twisties") have flocked to the sport in droves, producing a backlash among some longtime fans who have started tuning out.

Let $G(t)$ model the rate at which pigglystick has attracted new fans, and $L(t)$ the rate at which the sport has lost fans, in millions of fans per week, t weeks after the two celebrities started dating on October 1st. Graphs of the continuous functions $G(t)$ and $L(t)$ are shown below.



- a. [2 points] Write an expression for the total number of new fans pigglystick attracted, in millions, over the first three weeks of October.

Answer: $\int_0^3 G(t) dt$ million fans.

- b. [2 points] Given that there were an estimated 200 million fans of pigglystick on December 3rd, which was exactly nine weeks after October 1st, write an expression for the number of fans pigglystick had on October 1st, in millions.

Answer: $200 - \int_0^9 (G(t) - L(t)) dt$ million fans.

- c. [2 points] Estimate the rate, in millions of fans per week, at which the number of fans of pigglystick was changing on November 5th, which is five weeks after October 1st.

Answer: ≈ 3.7

- d. [2 points] Estimate the time, in number of weeks after October 1st, when pigglystick had the *most* fans.

Answer: ≈ 8.2

- e. [2 points] Write an expression for the average rate of change in the number of fans of pigglystick over the ten weeks following October 1st, in millions of fans per week.

Answer: $\frac{1}{10} \int_0^{10} (G(t) - L(t)) dt$