6.5 Partial Fractions and Logistic Growth Assignment **Name:**_____

1. The spread of a disease through a community can be modeled with the logistic equation $y = \frac{600}{1+59e^{-0.1t}}$, where y is the number of people infected after t days. How many people are infected when the disease is spreading the fastest?

(A) 10 (B) 59 (C) 60 (D) 300 (E) 600

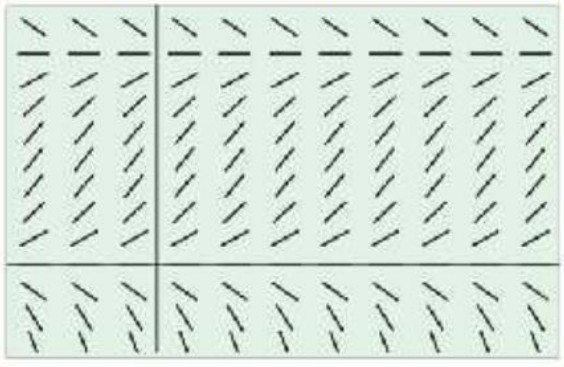
2. The spread of a disease through a community can be modeled with the logistic equation $y = \frac{0.9}{1+45e^{-0.15t}}$, where y is the proportion of people infected after t days. According to the model, what percentage of people in the community will not become infected?

(A) 2% (B) 10% (C) 15% (D) 45% (E) 90%

3. $\int_2^3 \frac{3}{(x-1)(x+2)}\,dx =$

(A) $-\frac{33}{20}$ (B) $-\frac{9}{20}$ (C) $\ln\left(\frac{5}{2}\right)$ (D) $\ln\left(\frac{8}{5}\right)$ (E) $\ln\left(\frac{2}{5}\right)$

4. Which of the following differential equations would produce the slope field shown below?



$[-3, 8]$ by $[-50, 150]$

(A) $\frac{dy}{dx} = 0.01x(120-x)$ (B) $\frac{dy}{dx} = 0.01y(120-y)$ (C) $\frac{dy}{dx} = 0.01y(100-x)$

(D) $\frac{dy}{dx} = \frac{120}{1+60e^{-1.2x}}$ (E) $\frac{dy}{dx} = \frac{120}{1+60e^{-1.2y}}$

5. The population $P(t)$ of a species satisfies the logistic differential equation $\frac{dP}{dt} = P\left(2 - \frac{P}{5000}\right)$, where the initial population is $P(0) = 3000$ and t is the time in years. What is $\lim_{t\to\infty} P(t)$?

(A) 2500 (B) 3000 (C) 4200 (D) 5000 (E) 10,000

6. Suppose a population of wolves grows according to the logistic differential equation $\frac{dP}{dt} = 3P - 0.01P^2$, where P is the number of wolves at time t, in years. Which of the following statements are true?

I. $\lim_{t\to\infty} P(t) = 300$

II. The growth rate of the wolf population is greatest when $P = 150$.

III. If $P > 300$, the population of wolves is increasing.

(A) I only (B) II only (C) I and II only (D) II and III only (E) I, II, and III

7. $\int \frac{7x}{(2x-3)(x+2)}dx =$

(A) $\frac{3}{2}\ln|2x-3| + 2\ln|x+2| + C$ (B) $3\ln|2x-3| + 2\ln|x+2| + C$ (C) $3\ln|2x-3| - 2\ln|x+2| + C$

(D) $-\frac{6}{(2x-3)^2} - \frac{2}{(x+2)^2} + C$ (E) $-\frac{3}{(2x-3)^2} - \frac{2}{(x+2)^2} + C$

8. $\int \frac{2x}{x^2+3x+2}dx =$

(A) $\ln|x+2| + \ln|x+1| + C$ (B) $\ln|x+2| + \ln|x+1| - 3x + C$ (C) $-4\ln|x+2| + 2\ln|x+1| + C$

(D) $4\ln|x+2| - 2\ln|x+1| + C$ (E) $2\ln|x| + \frac{2}{3}x + \frac{1}{2}x^2 + C$