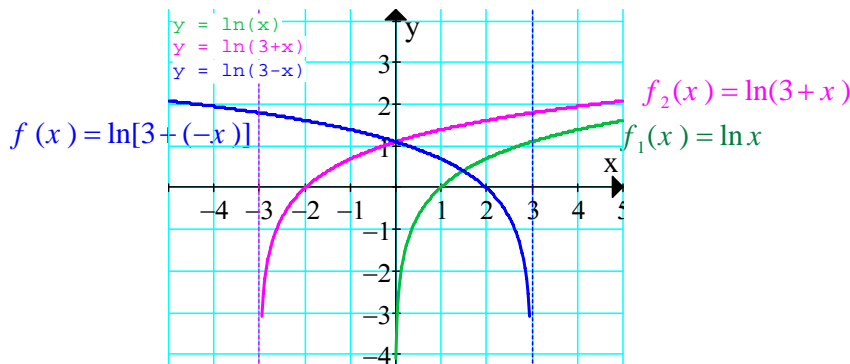


Show all necessary steps for full marks.

**Question 1: (7 points):** Sketch the graph of  $f(x) = \ln(3-x)$  by translation.

**Solution:**

Let  $f_1(x) = \ln x$ ,  $f_2(x) = \ln(3+x)$  and  $f(x) = \ln[3+(-x)]$



**Question 2: (7 points):** If  $\log 2 = x$  and  $\log 3 = y$ , then find  $\log\left(\frac{\sqrt{135}}{50}\right)$  in terms of  $x$  and  $y$ .

**Solution:**

Q6.

$$\begin{aligned} \text{If } \log 2 = x \text{ and } \log 3 = y, \text{ then } \log\left(\frac{\sqrt{135}}{50}\right) &= \log \sqrt{135} - \log 50 \\ &= \frac{1}{2} \log 5(27) - \log \frac{100}{2} \\ &= \frac{1}{2} \log 5 + \frac{1}{2} \log 3^3 - \log 100 + \log 2 \\ &= \frac{1}{2} \log \frac{10}{2} + \frac{3}{2} \log 3 - 2 + \log 2 \\ &= \frac{1}{2} \log 10 - \frac{1}{2}x + \frac{3}{2}y - 2 + x \\ &= \frac{1}{2} - 2 + \frac{1}{2}x + \frac{3}{2}y \\ &= -\frac{3}{2} + \frac{1}{2}x + \frac{3}{2}y \end{aligned}$$

✓ A)  $\frac{1}{2}x + \frac{3}{2}y - \frac{3}{2}$

B)  $\frac{x+3y}{4x+2}$

C)  $\frac{3}{2}x + \frac{1}{2}y + \frac{3}{2}$

D)  $-\frac{1}{2}x - \frac{3}{2}y + \frac{1}{2}$

E)  $\frac{-x-3y}{4x-2}$

**Question 3: (6 points):** Solve  $\log(x+8) + \log(2x+13) = \log(4-x)$

**Solution:**

$$\log[(x+8)(2x+13)] = \log(4-x)$$

$$(x+8)(2x+13) = 4-x$$

$$2x^2 + 29x + 104 = 4-x$$

$$2x^2 + 30x + 100 = 0$$

$$x^2 + 15x + 50 = 0$$

$$(x+5)(x+10) = 0$$

$$x = -5 \quad x = -10 \text{ rejected}$$

$$SS = \{-5\}$$