Work through the following problems while the instructor and TA circulate. When you have completed the problems (to the satisfactory of the facilitators) you can spend the rest of the lab working on the weeks homework.

Warm up:

Part (a): Find the domain for the following functions:

- $\frac{-5}{x+3}$
- $\frac{2-x}{2x-1}$
- $\frac{x+7}{x^2+3x+2}$
- $\frac{x+7}{x^2+5x-14}$

Part (b): Compute the following limits

- $\lim_{x \to -\infty} e^x$
- $\lim_{x \to \infty} e^{-x}$
- $\lim_{x \to -\infty} e^{-x}$
- $\lim_{x \to \infty} e^x$
- $\lim_{x \to \infty} \left(e^{-x} + 15\right)$
- $\lim_{x \to \infty} \frac{-5}{e^x - 2017}$
Questions:

Note [Vertical Asymptote]: The points which are not in the domain of a rational function \( f(x) \) are the candidate for the vertical asymptote. Although, we must check the limit of \( f(x) \) when \( x \) approaches those points to make sure they are the vertical asymptotes (or not).

1. Find all the vertical asymptote of the following functions:

   \[
   \begin{align*}
   &\frac{-5}{x+3} \\
   &\frac{2-x}{2x-1} \\
   &\frac{x+7}{x^2+3x+2} \\
   &\frac{x+7}{x^2+6x-14}
   \end{align*}
   \]

Note [Horizontal Asymptote]: In order to find the Horizontal Asymptotes for a function \( f(x) \), we compute the following limits:

\[
\lim_{x \to \infty} f(x) = L \quad \text{and} \quad \lim_{x \to \infty} f(x) = M.
\]

Then, \( y = L \) and \( y = M \) are the horizontal Asymptotes for function \( f(x) \).

2. Find all the horizontal asymptote of the following functions:

   \[
   \begin{align*}
   &\frac{-5}{e^{x}-2017} \\
   &\frac{5}{e^{-x}+7} \quad "Midterm 2015" \\
   &\frac{2}{e^{-x}+e^x} \quad "Midterm 2016"
   \end{align*}
   \]