Problems:

- **Problem 1:** 8.3.13
- **Problem 2:** 8.6.1
- **Problem 3:** 8.9
- **Problem 4:** You are given a Laplace Transform of the function \( f(t) \):

\[
F(s) = \frac{\beta_n s^n + \ldots + \beta_0}{s^m (\alpha_{n+1} s^{n+1} + \ldots + \alpha_0)}
\]

where \( \alpha_{n+1} \neq 0 \) and the values of \( s \in \mathbb{C} \) such that \( \alpha_{n+1} s^{n+1} + \ldots + \alpha_0 = 0 \) all have a real-part less than zero.

1) Calculate \( \lim_{t \to \infty} f(t) \) for \( m = 0, 1, \) and 2 (if calculable).

2) Write some general rules describing the long-time solution to a linear constant-parameter ODE as a function of system type.