Unit 2 Lesson 4

- If an ODE is stable, we call its particular solution ~~stea~~ the "steady state solution," and the homogenous solution the transient solution.

- If a system is stable, the transient solution goes to 0 as $t \to \infty$.

- In ~~the~~ an ODE of the form
$$a_0 \ddot{y} + a_1 \dot{y} + a_2 y = r(t),$$
y is called the response and r(t) is called the input.

- For a second order ODE of the form above with roots r_1 and r_2, it is stable if
  - $r_1 \neq r_2$ and both are real: if $r < 0$
  - $r_1 = r_2$: if $r < 0$
  - $r = a + ib$: if $a < 0$

- Define a new notation:
$$p(D)\,x = q = a_n x^{(n)} + a_{n-1} x^{(n-1)} + \dots + a_1 x + a_0 = q$$

- The transience theorem states that all $x = x(t)$ satisfying
$$p(D)\,x = 0$$
decay to 0 if ~~all~~ $\text{real}(r) < 0$.

Unit 2 Lesson 4 Problems

1: The phase lag increases

2: The amplitude increases