

## II. Finding $p(D)$

**Quiz:** Suppose  $W(s) = \frac{s}{s^2 + 1}$ . Find  $p(D)$  so that  $W(s)$  is the transfer function for the system  $p(D)x = f(t)$ .

**Choices:**

- a)  $\cos(t)$
- b)  $D^2 + I$
- c)  $D + 1/D$
- d) It doesn't exist
- e) Can't be found with the data given

**Answer:** (d)

The system  $p(D)x = f(t)$  has transfer function  $1/p(s)$ . Since  $W(s)$  is not one over a polynomial there is no such polynomial.

Note that  $W(s)$  is the transfer function for the system  $\ddot{x} + x = \dot{y}$ , where we consider  $y$  to be the input.

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