

## Part II Problems

**Problem 1:** [Step and delta responses]

- (a) Find the unit impulse response  $w$  for the LTI operator  $2D^2 + 4D + 4I$ .
- (b) Find the unit step response  $v$  for the same operator.
- (c) Verify that  $\dot{v} = w$  (as it should be, since  $\dot{u} = \delta$ ).
- (d) For each of the following functions, find the LTI differential operator  $p(D)$  having it as unit impulse response.
  - (i)  $2u(t)$ .
  - (ii)  $u(t)t$ .
  - (iii)  $u(t)t^2$ .

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