

# Homework 18 MATH 304 Section 3

**Assigned:** Monday, November 10.

**Potentially Collected:** Monday, November 17.

1. Define the linear transformation  $D : \mathbb{P}_2 \rightarrow \mathbb{P}_2$  where  $D(p(x)) = p'(x)$ . Let  $Y = (1, x, x^2)$  and  $A = (-1 + x, 1 + x)$ .
  - (a) Is  $A$  a basis for  $\mathbb{P}_2$ ? Find a basis  $Z$  for  $\mathbb{P}_2$  which contains  $A$ .
  - (b) Find  ${}_Y D_Y$ .
  - (c) Find  ${}_Z D_Z$ ,  ${}_Y D_Z$ , and  ${}_Z D_Y$  through the definition.
  - (d) Find the change of basis matrices  ${}_Y I_Z$  and  ${}_Z I_Y$ . Use the change of basis matrices and  ${}_Y D_Y$  to find  ${}_Z D_Z$ ,  ${}_Y D_Z$ , and  ${}_Z D_Y$ .