REVIEW SHEET 8, Math 540, Summer 2021, Melody Chan

Due Fri June 11 at 11:59pm Eastern Time

Submit all of the following on Gradescope, and don't forget to tag each answer to its page. We have implemented a course policy whereby failing to tag results in half credit.

I put a copy of this review sheet in the Overleaf folder.

(1) For each of the following linear maps $T: \mathbb{R}^2 \to \mathbb{R}^2$, write down the matrix of T, with respect to the standard basis of $\mathbb{R}^2$ on both copies of $\mathbb{R}^2$. (You should convince yourself that each map is linear, but you do not need to prove anything in this problem. Just compute the answer.)

(a) Dilation by a factor of 2 with respect to the origin; that is, the map T that sends each vector v to $2v$.

(b) Reflection across the line $x = y$. (Here x and y denote the usual coordinates (x, y) of $\mathbb{R}^2$.)

(c) Projection to the line $x = y$. That is, T sends v to the point on the line $x = y$ that is closest to v.

(d) The identity map, sending each vector to itself.

(2) Do the same for each of the linear maps in the previous problem, but now with respect to the basis $(1, 0), (1, 1)$ on *both* copies of $\mathbb{R}^2$.

(a)

(b)

(c)

(d)