Math 110 Homework 11

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1 Exercises 7.B

Problem 3: Define the linear map T as follows for each $z = (z_1, z_2, z_3) \in \mathbb{C}^3$.

$$Tz = (2z_1, 3z_2, 2z_1)$$

Note the switch up in the last spot. We can check that T is indeed closed under addition and scalar multiplication, thus a linear map. Firstly, $\lambda = 2$ is an eigenvalue with the eigenvector $w = (1, 0, 1)$.

$$T(1,0,1) = (2,0,2) = 2(1,0,1)$$

Similarly, $\lambda = 3$ is an eigenvalue with the eigenvector $w = (0, 1, 0)$.

$$T(0,1,0) = (0,3,0) = 3(0,1,0)$$

Finally, $(T^2 - 5T + 6I)z \neq 0$ if $z_3 \neq 6z_1$. So given we have values that are nonzero after that linear map, $T^2 - 5T + 6I \neq 0$.

Problem 4: