## Math 110 Homework 3

Due Tuesday July 3, 2018
Covers Material from Axler sections 5.A, 5.B, 5.C

1. Axler 5.A 3
2. Axler 5.A 8
3. Axler 5.B 3
4. Axler 5.C 16
5. removed
6. Let $V$ be the real vector space of power series with real coefficients:

$$
a_{0}+a_{1} x+a_{2} x^{2}+a_{3} x^{3}+\cdots, a_{i} \in \mathbb{R}
$$

Note that any two power series can be added together and can be multiplied by elements of $\mathbb{R}$, so power series do indeed form a real vector space.
Consider the linear map

$$
\begin{gathered}
T: V \rightarrow V \\
u \mapsto \frac{d^{2} u}{d x^{2}}
\end{gathered}
$$

For each $\lambda \in \mathbb{R}$, find compute the dimension of the $\lambda$-eigenspace of $T$. Find a basis for each eigenspace. How does this relate to the functions sin and cos?

