Homework 1 Supplement

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1 Linear Algebra

1.1 Vector Spaces

Definition 1. *A vector space over a field $\mathbb{F}$ is a set V with two operations that satisfy the following axioms:*

1. ***Closure under addition and scalar multiplication*** *- $\boldsymbol{u} + \boldsymbol{v} \in V$ for $\boldsymbol{u}, \boldsymbol{v} \in V$*
2. ***Commutativity of Addition*** *- $\boldsymbol{u} + \boldsymbol{v} = \boldsymbol{v} + \boldsymbol{u}$, $\forall \boldsymbol{u},\boldsymbol{v} \in V$*
3. ***Associativity of Addition*** *- $\boldsymbol{u} + (\boldsymbol{v} + \boldsymbol{w}) = (\boldsymbol{u} + \boldsymbol{v}) + \boldsymbol{w}$, $\forall \boldsymbol{u},\boldsymbol{v},\boldsymbol{w} \in V$*
4. ***Additive Identity*** *- There exists an element $\boldsymbol{0} \in V$ such that $\boldsymbol{v} + \boldsymbol{0} = \boldsymbol{v} \; \forall \; \boldsymbol{v} \in V$*
5. ***Additive Inverse*** *- For every $\boldsymbol{v} \in V$, there exists an element $(-\boldsymbol{v}) \in V$ such that $\boldsymbol{v} + (-\boldsymbol{v}) = \boldsymbol{0}$*
6. ***Scalar Identity*** *- $1\boldsymbol{v} = \boldsymbol{v}$ where 1 is the multiplicative identity in $\mathbb{F}$*
7. ***Distributivity 1*** *- $a(b\boldsymbol{v}) = (ab)\boldsymbol{v}$*
8. ***Distributivity 2*** *- $a(\boldsymbol{u} + \boldsymbol{v}) = a\boldsymbol{u} + a\boldsymbol{v}$*
9. ***Distributivity 3*** *- $(a + b)\boldsymbol{v} = a\boldsymbol{v} + b\boldsymbol{v}$*

For the purposes of demonstrating ability to create boxes and mathematical formulas (aside from the ones shown above), here is a general formula for *Picard Iterations*:

$$y(x) = y_0 + \int_{x_0}^{x} f(s, y(s))ds$$

Now in an effort to demonstrate my ability to put pictures in my LaTeXdocument, here is a picture of my Spring 2018 class schedule.