MASSACHUSETTS INSTITUTE OF TECHNOLOGY
Department of Electrical Engineering and Computer Science

6.622 Power Electronics	Issued: April 19, 2023
Problem Set 9	Due: April 24, 2023

Reading:	KPVS Chapter 12 through 12.4; KPVS Chapter 13 through 13.1, 13.3
Note:	*Work on the design project!*

Problem 9.1

Consider a continuous conduction mode buck converter to be operated under peak current mode control. The converter parameters are f_{sw} = 500 kHz, L = 6.8 µH, C = 800 µF, and Vout,ref = 10 V. What is the smallest magnitude of compensating ramp that will yield stable dynamics for the ripple instability over an input voltage range of 15 V < Vin < 30 V?

Note: Models for computing the ripple dynamics will be discussed in class. They can also be found in: H. Hsu, A. Brown, L. Rensink, and R.D. Middlebrook, "Modeling and Analysis of Switching dc-to-dc Converters in Constant-Frequency Current-Programmed Mode," 1979 IEEE Power Electronics Specialists Conference, pp. 284-301, *and in* R.W. Erickson, Fundamentals of Power Electronics, Boston: Kluwer, 1997, Chapter 11 (Current Programmed Control).