HOMEWORK
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December 1, 2016

Please answer the following questions in complete sentences in submit the solution on Blackboard November 22, 2016 by 5pm.

Homework 6

Problem 1: Derive a method (20 points)

1. Chapter 10, Exercise 2 (10 points)
2. Chapter 10, Exercise 3 (10 points)

Problem 2: An error study (10 points)

Complete chapter 10, Problem 6c.

Problem 3: A new hire (15 points)

You have just been hired at Aperature Science Labs, one of the premier institutes of numerical computing. One of their specialities is evaluating numerical representations of complex phenomenon. You've been brought on in a top-secret project that is going to study the basics of numerical integration that underlie Aperature's advanced simulations. Your goal: produce a report on the accuracy and computational cost of evaluating

$$\int_0^1 \cos(x^2)\,dx$$

via numeric integration. Your report should contain a summary recommendation on your findings with state-of-the-art methods to evaluate this routine. It should include at least three different methods; and some form of chart that your boss can present to the weekly meeting.

Problem 4: Sleepless nights (20 points)

1. Chapter 11, Problem 3 (10 points)
2. Chapter 11, Problem 8 (10 points)

Problem 5: A choice! (15 points)

Please choose your own adventure! You only need to do one of the following problems.

Theory Chapter 11, Problem 11 (You will have to read in the book about how to show multi-step methods are convergent.)

Experiment Chapter 11, Problem 14. Here, you should use the version of 4th order Runge-Kutta in Section 11.2.5. Make sure you show at least one illustration of the numerical problem described with small $w(0)$.

Problem 6: Look and explain! (10 points)

Take a look at the raptorchase code from the start of class. Go through it an explain what each segment does! You may use as much or as little granularity as you want.