

## Assignment 5

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### NOTES

It is just about Legendre. It should be fairly easy. Submit on time, and do not cheat!

### 1 PRACTICAL PROBLEMS

These problems are designed to make you familiar with Legendre and the solution of Laplace's in spherical case.

PROBLEM 1 (3 MARKS). Compute the first 5 degrees of Legendre. Assume that  $m$  is zero. The equation for your solution is this

$$P_n(t) = -\frac{(n-1)}{n}P_{n-2}(t) + \frac{2n-1}{n}tP_{n-1}(t), \quad (1.1)$$

Notice that, in the section I have not included the minus sign in the first term in rhs.

### 2 PROGRAMMING PROBLEMS

For the assignment problems you will be given a starter code (legendre\_polynomials.m, legendre\_full.m). Use them to help you solve this problem.

PROBLEM 2 (3 MARKS). Write a program that solves the Legendre function recursively. Use the previous equation (1.1). ONLY implement this algorithm!

PROBLEM 3, (4 MARKS). Write a general program that solves Legendre function for  $m, n$ . Use this equation

$$P_{(n,m)}(t) = -\frac{(n+m-1)}{n-m}P_{(n-2,m)}(t) + \frac{2n-1}{n-m}tP_{(n-1,m)}(t), \quad (2.1)$$

Where  $m \leq n$ .

What is different is this  $m$  term. For each degree  $n$ , you need to compute it  $m$  times.

### 3 COLLABORATION

As we have said in the section, you are highly encouraged to work together, but you have to make sure that *all* of your submission is yours! We have very strict collaboration policy, so please make sure that you anything your submit is yours, and whenever you used someone's work you clearly indicate that (by citing them).

Another important thing, whenever you have collaborated with someone, please write down their names. Having done will save you from getting zero marks. There is no penalty of writing the names of people you have worked with them—they won't also get any credit for that—it's just for us to know that you have worked together. Again, working together does *not* mean giving someone's your code!

Another thing, we need to know the hours you have spent on working with each assignment, so that we can know exactly if it is too much (or too little!). Please provide correct answers, I mean we will give you any extra credits if you solve your assignment in one hour! It is just for us to make sure that we are not giving you too much.

**I've collaborated with:** .....

**Approximate hours for this assignment:**..... hours