Phys 517: Final Exam

Fall 2016

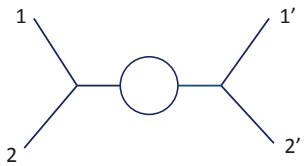
- Write your name and Student ID number in the space provided below and sign.

Name, Last Name:	
ID Number:	
Signature:	

- This is a take-home exam that is to be turned in to the instructor before 17:00 on January 09, 2017.
- Problems 1 and 2 will be selected from among Homework 7 problems and these will contribute a total of 60 points. The remaining 40 points will be for your solution to Problem 3. You must hand in your solutions to all the Homework 7 problems together with your solution to Problem 3.
- You should not write up the solution to different problems in a single sheet of paper. Mark the problem numbers clearly and use this exam paper as the cover page for your solutions.
- Write your solution to the exam problems in a readable manner and give the details of your calculations.

Problem 3

3.a (20 points) Consider the calculation of the probability amplitude $\langle f|i\rangle$ for a two-particle elastic scattering. Verify the momentum-space Feynman rules given on page 77 of the textbook (Srednicki) by calculating the contribution of the following one-loop configuration-space diagram to $\langle f|i\rangle$.



You are being asked to reproduce the value of the corresponding momentum-space diagram without using the the momentum-space Feynman rules. Do not evaluate the loop integral.

3.b (20 points) In the second paragraph on page 123 of the textbook, Srednicki gives an argument that he uses to derive Eq. (20.2). Verify this argument by giving a direct derivation of the first term on the right-hand side of this equation using the LSZ formula. You are being asked to verify the rule about replacing the square of the momenta for the external lines with $-m^2$.