NOTE: Be sure to show your work and explain what you are doing. (Correct answers, for which we cannot follow the work, are worth no credit).

1. Use the Euler-Maclaurin integration formula to evaluate (10 points:5+5)
   (a) \( \sum_{m=1}^{n} m^3 \)
   (b) \( \sum_{m=1}^{n} m^4 \)

2. Prove that \( \int_{0}^{\infty} \frac{x^n e^x}{(e^x-1)^2} \, dx = n! \zeta(n) \) with \( \zeta(n) \) the Riemann Zeta function (10 points)

3. Problem 5.10.4 (A&W)(10 points)

4. Problem 7.3.4 (A&W)(10 points)

5. Problem 7.3.7 (A&W) (10 points)
   Bonus (10 points): Use the procedure derived in class to generate higher order terms in the steepest descent method to obtain \( a_0 \) and \( a_1 \)