Name: _____   Dept: _____   ID No: _____

1. (3 points) Compute the following integral using the Gauss quadrature with $n = 3$.

$$\int_1^5 \frac{1}{1 + x^2} dx$$

2. (7 points) Interpolate

$$f_0 = f(0) = -1, \ f_1 = f(1) = 3, \ f_2 = f(2) = 7, \ f_3 = f(3) = 7$$

by the cubic spline satisfying $k_0 = -1$ and $k_3 = 2$.

3. (5 points) If B has the columns of A in reverse order, show that $A - B$ is not invertible.

4. (15 points)

   (a) (5 points) For any permutation P, show that $P^k = I$, for some $k \in \{1, 2, 3, \cdots \}$.

   (b) (10 points) Find a 5×5 permutation P such that $P^6 = I$, but $P^k \neq I$, for $k = 1, 2, 3, 4, 5$.