Read all directions carefully and write your answers in the space provided. To receive full credit, you must show all of your work.

Question 1: (30pts).   • Evaluate the definite integral

$$\int xe^{x^2}\,dx$$

• Explain why the definite integral bellow can not be solved similar to part (1):

$$\int e^{x^2}\,dx$$

• Solve the definite integral bellow if you know a is constant

$$\int x\sqrt{x-a}\,dx.$$

Question 2: (20pts).　　1. Evaluate the definite integral:

$$\int x \sin(x)\, dx$$

2. Let n be a natural number greater than 2. Try to rewrite this integral to a simpler one.

$$\int x^n \sin(x)\, dx$$

Question 3: (25pts).　　1. Assuming you know this prtial fraction $\frac{x-2}{x^4+x^2} = \frac{1}{x} - \frac{2}{x^2} + \frac{-x+2}{1+x^2}$ evaluate the integral bellow:

$$\int \frac{x-2}{x^4+x^2}\, dx,$$

2. Multiple Choice: Choose one answer. What is the best pair of substitutions for evaluating $\int \sin^3 x \cos^2 x\, dx$

　(a) Substitute $1 - \sin^2 x$ in for $\cos^2 x$ and then let $u = \sin x$
　(b) Substitute $1 - \sin^2 x$ in for $\cos^2 x$ and then let $u = \cos x$
　(c) Substitute $1 - \cos^2 x$ in for $\sin^2 x$ and then let $u = \sin x$
　(d) Substitute $1 - \cos^2 x$ in for $\sin^2 x$ and then let $u = \cos x$

Question 4: (15pts). Assume you have a piecewise function in each part that function is linear positive and increasing. From all the estimation method of integration we studies, which one do you think will be best estimation? if you allowed to partition the range in which you take the integration.

Question 5 Bonus : (5pts). Write Name of memember of your group.