MATH 220 E1 QUIZ #14(Last) (20 points)

(12 minutes, 23 April 1999 {14th Week}, PDEs: 10.5)

NAME:

SOCIAL SECURITY NUMBER (SSN):

DISCUSSION TIME AND DAY (DT&D):

1. Formally Solve IVP/BVP for Heat Equation:

$$\boldsymbol{PDE:}\ \frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2} - 6 \cdot x \cdot (\pi - 2 \cdot x)\ ,$$
$$0 < x < \pi/2\ ,\ t > 0\ ;$$

$$\boldsymbol{BCs:}\ u(0,t) = 0, \quad u(\pi/2,t) = 50\pi + (\pi/2)^4,$$
$$t > 0\ ;$$

$$\boldsymbol{IC:}\ u(x,0) = 100 \cdot x + x^3 \cdot (\pi - x)$$
$$+64 \cdot \sin(2 \cdot x)\ \ 0 < x < \pi/2\ ;$$

by Separation of Variables and Nonhomogeneous Terms, with Fourier Series Methods. <u>You Must Show Your Work.</u>

Fourier Sine Coefficient for $f(x)$ *on* $0 < x < L$ *(if needed):*

$$\boldsymbol{FSC:}\ b_n = \frac{2}{L}\int_0^L f(x)\sin\left(\frac{n\pi x}{L}\right)dx;$$