**Part B** **Name:**_____
**Total Weight: 60 points**

# Multivariable and Complex Analysis Midterm

**SHOW ALL WORK TO RECEIVE FULL CREDIT**

1. (15) Show that the form under the integral sign is exact in the path independent plane from point $a : (\pi/2, \pi)$ to $b : (\pi, 0)$, then evaluate the integral.

$$\int_a^b \left( \frac{1}{2} \cos \frac{1}{2} x \cos 2y \; dx - 2 \sin \frac{1}{2} x \sin 2y \; dy \right)$$

2. (10) Find the eigenvalues and corresponding eigenvectors of **A**. *To receive full credit, you must show all work.* Is **A** diagonalizable?

$$\mathbf{A} = \begin{bmatrix} 13 & 4 & 2 \\ 2 & 7 & -8 \\ 5 & 4 & 7 \end{bmatrix}$$

3. (10) Find and sketch the parametric representation of a circle in the $yz$-plane with center $(4, 0)$ and passing through the point $(0, 3)$.

4. (10) Find basis for null space of **A**, where

$$A = [\mathbf{a}_1\ \mathbf{a}_2\ \mathbf{a}_3] = \begin{bmatrix} -1 & 2 & 3 \\ -4 & 1 & 1 \end{bmatrix}$$

5. (15) Evaluate the surface integral $\iint_S (curl\ \mathbf{F}) \cdot \mathbf{n}\ dA$ directly for

$$\mathbf{F} = [-13\sin y, 3\sinh z, x],$$

and $S$ is the rectangle with vertices $(0, 0, 2)$, $(4, 0, 2)$, $(4, \pi/2, 2)$, $(0, \pi/2, 2)$.