

**DIRECTIONS** To receive full credit, you must provide complete legible solutions to the following problems in the space provided. No Attached papers. Transfer all your answers to the space provided.

1. Use Stokes' Theorem to evaluate  $\iint_S \text{Curl} \mathbf{F} \cdot d\mathbf{S}$ ,  $F(x, y, z) = x^2 z^2 \mathbf{i} + y^2 z^2 \mathbf{j} + xyz \mathbf{k}$

S is the part of the paraboloid  $z = x^2 + y^2$  that lies inside the cylinder  $x^2 + y^2 = 16$ , oriented upward.

Ans \_\_\_\_\_

2. Use Stokes' Theorem to evaluate

Ans \_\_\_\_\_

$$\int_C \mathbf{F} \cdot d\mathbf{r}, F(x, y, z) = (x + y^2) \mathbf{i} + (y + z^2) \mathbf{j} + (z + x^2) \mathbf{k},$$

C is the triangle with vertices  $(7, 0, 0)$ ,  $(0, 7, 0)$ , and  $(0, 0, 7)$ , oriented counterclockwise as viewed from above.

3. Use Stokes' Theorem to evaluate  $\int_C \mathbf{F} \cdot d\mathbf{r}$ ,  $\mathbf{F}(x, y, z) = xy\mathbf{i} + 4z\mathbf{j} + 6y\mathbf{k}$   
where C is oriented counterclockwise as viewed from above.  
C is the curve of intersection of the plane  $x + z = 5$  and the cylinder  $x^2 + y^2 = 144$   
Ans \_\_\_\_\_

4. A particle moves along line segments from the origin to the points  $(2, 0, 0)$ ,  $(2, 3, 1)$ ,  
 $(0, 3, 1)$ , and back to the origin under the influence of the force field  
 $\mathbf{F}(x, y, z) = z^2\mathbf{i} + 3xy\mathbf{j} + 5y^2\mathbf{k}$ . Find the work done.      Ans \_\_\_\_\_