General Directions: Please place answers in the blanks and spaces provided. Work must be shown to support correct answers to receive full credit. Calculators are allowed for simple arithmetic calculations only.

1. (2 pts) Evaluate the following double integral. Show work or no credit.

\[ 4 \int_{1}^{4} \int_{y}^{4} x y \, dx \, dy = \]

2. (2 pts) The table below gives values of \( f(x, y) \), the number of bull frogs per square mile in a Lousiana swamp. If \( x \) and \( y \) are in miles and \( R \) is the rectangle \( 0 \leq x \leq 8 \) and \( 0 \leq y \leq 6 \), find an upper estimate for \( \int_{R} f(x, y) \, dA \).

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<tbody>
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3. (3 pts) Set up a triple integral for finding the volume trapped between the paraboloid \( z = x^2 + y^2 \) and the plane \( z = 9 \). Do not evaluate the integral.

\[ \int \int \int dz \, dy \, dx \]
7. Find parametrizations for the following curves.

   a. (3 pts) In 3-D a line passing through the points (2,1,5) and (7,0, 4) with \(0 \leq t \leq 1\).

   \[\begin{align*}
x &= \underline{\phantom{00000000}} & y &= \underline{\phantom{00000000}} & z &= \underline{\phantom{00000000}}
\end{align*}\]

   b. (2 pts) In 2-D an ellipse centered at the origin crossing the x-axis at \(\pm 4\) and the y-axis at \(\pm 6\).

   \[\begin{align*}
x &= \underline{\phantom{00000000}} & y &= \underline{\phantom{00000000}}
\end{align*}\]

8.(2 pts) Describe in words the curve parameterized by the vector equation

\[\mathbf{r} = 6 \cos t \mathbf{i} + 6 \sin t \mathbf{j} + t \mathbf{k}.\]

9. (1 pt) Which of the following formulas best matches the graph of the vector field shown?

   a. \(\mathbf{F} = x \mathbf{j}\)  
   b. \(\mathbf{F} = x \mathbf{i} + y \mathbf{j}\)  
   c. \(\mathbf{F} = y \mathbf{j}\)  
   d. \(\mathbf{F} = 3 \mathbf{i} + 4 \mathbf{j}\)

10. (1 pt) Do you expect the line integral of the pictured vector field to be positive, negative, or zero?