1. Find the length of the curve.
   a) \( \mathbf{r}(t) = (t, \sin(3t^2), \cos(3t^2)) \)
   b) \( \mathbf{r}(t) = (\cos 4t, \sin 4t, t) \)
   c) \( \mathbf{r}(t) = 2t\mathbf{i} + t^2\mathbf{j} + \ln t\mathbf{k} \)
   for \( 0 \leq t \leq 1 \)
   for \( 0 \leq t \leq 1 \)
   for \( 1 \leq t \leq 3 \)

2. Let \( C \) be the curve of intersection of the parabolic cylinder \( 48z = x^2 \) and the surface \( 9y^2 = 16xz \). Find the exact length of \( C \) from the origin to the point \((48, 64, 48)\). 

3. Find the limit, if it exists, or show that the limit does not exist.
   a) \( \lim_{(x,y) \to (0,0)} \frac{x^2 + xy + y^2}{xy} \)
   b) \( \lim_{(x,y) \to (1,-1)} e^{-xy} \cos(x + y) \)
   c) \( \lim_{(x,y) \to (0,0)} \frac{5y^4 \cos^2 x}{x^4 + y^4} \)
   d) \( \lim_{(x,y) \to (1,0)} \frac{xy - y}{(x - 1)^2 + y^2} \)
   e) \( \lim_{(x,y) \to (0,0)} \frac{xy^4}{x^2 + y^8} \)

4. Determine the set of points at which the function is continuous.
   a) \( f(x, y) = \frac{1 + x^2 + y^2}{1 - x^2 - y^2} \)
   b) \( f(x, y) = \begin{cases} 
   \frac{x^2y^3}{2x^2 + y^2} & \text{if } (x, y) \neq (0, 0) \\
   1 & \text{if } (x, y) = (0, 0) 
   \end{cases} \)

Course Homework due Feb 19, Wed.
Feb 10, Mon. : 13.2 45, 47, 49, 50. 13.3 1, 3, 5, 11
Feb 12, Wed. : 14.1 23, 27, 29, 30, 32, 55-60 (total 6 problems)
Feb 14, Fri. : 14.2 1, 5, 9, 13, 17, 19, 29, 33

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