1. Find the length of the curve.

   a) $\mathbf{r}(t) = \langle t, \sin(3t^2), \cos(3t^2) \rangle$ for $0 \le t \le 1$

   b) $\mathbf{r}(t) = \langle \cos 4t, \sin 4t, t \rangle$ for $0 \le t \le 1$

   c) $\mathbf{r}(t) = 2t\mathbf{i} + t^2\mathbf{j} + \ln t\,\mathbf{k}$ for $1 \le t \le 3$

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) $\displaystyle\lim_{(x,y)\to(0,0)} \frac{x^2 + xy + y^2}{xy}$

   b) $\displaystyle\lim_{(x,y)\to(1,-1)} e^{-xy}\cos(x+y)$

   c) $\displaystyle\lim_{(x,y)\to(0,0)} \frac{5y^4\cos^2 x}{x^4 + y^4}$

   d) $\displaystyle\lim_{(x,y)\to(1,0)} \frac{xy - y}{(x-1)^2 + y^2}$

   e) $\displaystyle\lim_{(x,y)\to(0,0)} \frac{xy^4}{x^2 + y^8}$

4. Determine the set of points at which the function is continuous.

   a) $f(x,y) = \dfrac{1 + x^2 + y^2}{1 - x^2 - y^2}$

   b) $f(x,y) = \begin{cases} \dfrac{x^2y^3}{2x^2 + y^2} & \text{if } (x,y) \neq (0,0) \\ 1 & \text{if } (x,y) = (0,0) \end{cases}$

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