1. Determine whether the lines L_1 and L_2 are parallel, skew, or intersecting. If they intersect, find the point of intersection.

   a) $\begin{cases} L_1 & : & x = 3+2t, & y = 4+4t, & z = 5+5t \\ L_2 & : & x = 3s, & y = -2+6s, & z = -1+7s \end{cases}$ b) $\begin{cases} L_1 & : & x = -t, & y = 2+2t, & z = 1+6t \\ L_2 & : & x = 2+2s, & y = 5-4s, & z = 13+11s \end{cases}$

2. Find an equation for the surface obtained by rotating $x = y^3$ about the y-axis.

3. Find the unit tangent vector $\mathbf{T}(t)$ at the point with the given value of the parameter t.

$$\mathbf{r}(t) = \langle t^3+3t, t^2+1, 3t+4\rangle, \qquad t = 1.$$

4. Prove the formula

$$\frac{d}{dt}[f(t)\mathbf{u}(t)] = f'(t)\mathbf{u}(t) + f(t)\mathbf{u}'(t).$$

5. Find the length of the curve.

   a) $\mathbf{r}(t) = 12t\mathbf{i} + 8t^{3/2}\mathbf{j} + 3t^2\mathbf{k}, \qquad 0 \le t \le 1.$ b) $\mathbf{r}(t) = (\cos t, \sin t, \ln\cos t), \qquad 0 \le t \le \frac{\pi}{4}.$

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