MATH 2415 Calculus of Several Variables

Fall-2019

PLTL-Week # 4(Sec 12.6-13.1)

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1. Sketch the following generalized cylinders
   (a) $y = x^2$ (b) $x = z^2$ (c) $y = x^2 + 4$ (d) $x = z^2 - 3$

   (e) $x^2 + z^2 = 9$ (f) $y^2 + z^2 = 9$ (g) $9x^2 + 4y^2 = 36$ (h) $4x^2 + z^2 = 4$

   (i) $x^2 - z^2 = 9$ (j) $y^2 - z^2 = 9$ (k) $9x^2 - 4y^2 = 36$ (l) $x + y = 3$
2. Graph the following surfaces of revolution: (Use cylindrical coordinates)
   (a) $z = x^2 + y^2$ (b) $x = y^2 + z^2$ (c) $y = x^2 + z^2$
3. Use traces to sketch the surfaces:
   (a) $\frac{x^2}{4} + \frac{y^2}{9} + z^2 = 1$ (b) $\frac{x^2}{4} + \frac{y^2}{9} - z^2 = 1$ (c) $\frac{x^2}{4} - \frac{y^2}{9} + z^2 = 1$

   (d) $z = x^2 + y^2$ (e) $z = 3x^2 + 4y^2$ (f) $x = 4y^2 + 9z^2$

   (g) $z = x^2 - y^2$ (h) $y = z^2 - x^2$ (i) $x = y^2 - z^2$
4. Describe and sketch the space curves defined by the vector functions:
   (a) $\mathbf{r}(t) = \langle 2 - 3t, 3t, 4 + t \rangle$
   (b) $\mathbf{r}(t) = \langle -3t + 2, 0, t + 4 \rangle$
   (c) $\mathbf{r}(t) = \langle 2, t, 2 + t^2 \rangle$
   (d) $\mathbf{r}(t) = 2\cos t\mathbf{i} + 2\sin t\mathbf{j} + 4\mathbf{k}$
   (e) $\mathbf{r}(t) = 2\cos t\mathbf{i} - 2\sin t\mathbf{j} + 4\mathbf{k}$
   (f) $\mathbf{r}(t) = 2\cos t\mathbf{i} + 2\sin t\mathbf{j} + 4t\mathbf{k}$
   (g) $\mathbf{r}(t) = 2\cos t\mathbf{i} - 2\sin t\mathbf{j} + 4t\mathbf{k}$
   (h) $\mathbf{r}(t) = 2\cos t\mathbf{i} + 3\sin t\mathbf{j} + 4\mathbf{k}$
   (i) $\mathbf{r}(t) = 2\cos t\mathbf{i} - 3\sin t\mathbf{j} + 4\mathbf{k}$
   (j) $\mathbf{r}(t) = 2\cos t\mathbf{i} + 3\sin t\mathbf{j} + 4t\mathbf{k}$
   (k) $\mathbf{r}(t) = 2\cos t\mathbf{i} - 3\sin t\mathbf{j} + 4t\mathbf{k}$
   (l) $\mathbf{r}(t) = \cos t\mathbf{i} + \cos t\mathbf{j} + \sin t\mathbf{k}$

5. Find the parametrization of the curve of intersection of the two surfaces:
   (a) The cone $y = \sqrt{x^2 + z^2}$ and the plane $y = 1 + z$
   (b) The cylinder $y^2 + z^2 = 9$ and the hyperboloid $x = y^2 - z^2$
   (c) The cylinder $x^2 + y^2 = 4$ and the plane $z = 4$
   (d) The cylinder $x^2 + y^2 = 4$ and the plane $y + z = 4$
   (e) The cylinder $4x^2 + 9y^2 = 36$ and the plane $y + z = 4$
   (f) The paraboloid $z = 2 + y^2$ and the plane $x = 2$
   (g) The paraboloid $z = 2 + y^2$ and the plane $x = y$