MATH 21A

Parametric Surfaces

For each of the following surfaces,

(a) write the surface in parameterized form as $\mathbf{r}(u, v)$, and

(b) describe the surface if possible.

1. $3x + 2y + z = 6$

2. $z = 4x^2 + \frac{y^2}{9}$

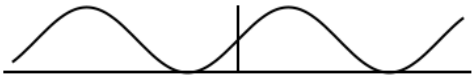
3. $y = 2z^2 - 3x^2$

4. $x = y^2 - z^2$

5. $x^2 + y^2 + z^2 = 9$

6. $\dfrac{x^2}{4} + \dfrac{y^2}{9} + z^2 = 1$

7. The graph of the curve
$y = 1 + \sin(x)$
revolved around the x-axis



8. The graph of the curve
$x = z^2 + z \qquad (0 \leq z \leq 2)$
revolved around the z-axis

MATH 21A

Parametric Surfaces – Matching

On this page, match the equation of the surface to the appropriate graph. Give reasons! (All surfaces have been graphed with the usual orientation of looking at the axes from the first octant.)

(a) $\mathbf{r}(u,v) = \langle u, \sin(u)\cos(v), \sin(u)\sin(v)\rangle$

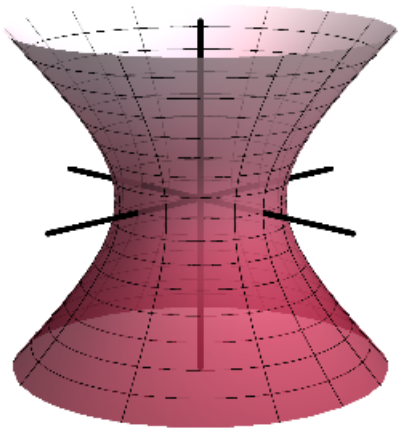
(b) $\mathbf{r}(u,v) = \langle u+1, v-2, 3-u-2v\rangle$

(c) $\mathbf{r}(u,v) = \langle u, v, \sqrt{u^2+v^2}\,\rangle$

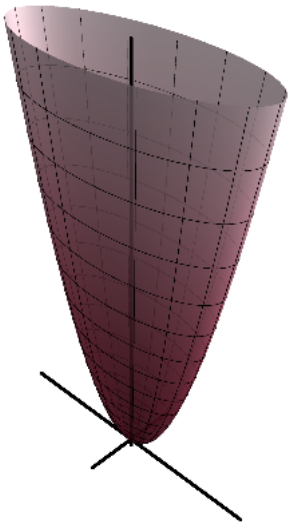
(d) $\mathbf{r}(u,v) = \langle \sin(u)\cos(v), \cos(u), \sin(u)\sin(v)\rangle$
$0 \le u \le \pi/2,\ 0 \le v \le \pi$

(e) $\mathbf{r}(u,v) = \langle av\cos(u), bv\sin(u), 2v^2\rangle$

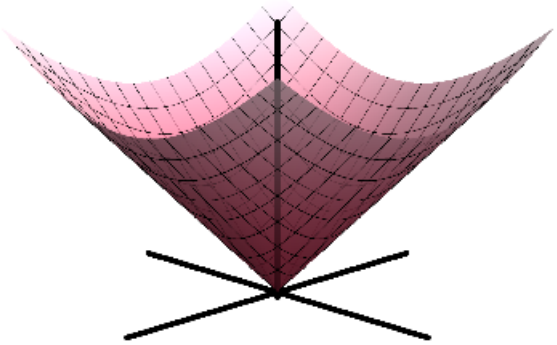
(f) $\mathbf{r}(u,v) = \langle \sqrt{1+u^2}\cos(v), \sqrt{1+u^2}\sin(v), u\rangle$



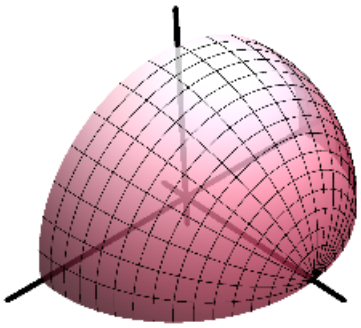
Graph I



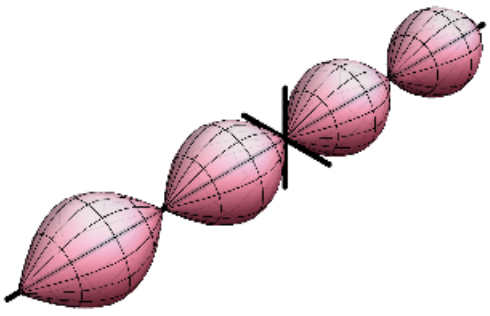
Graph II



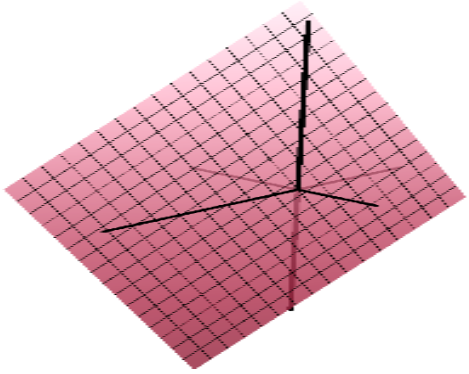
Graph III



Graph IV



Graph V



Graph VI