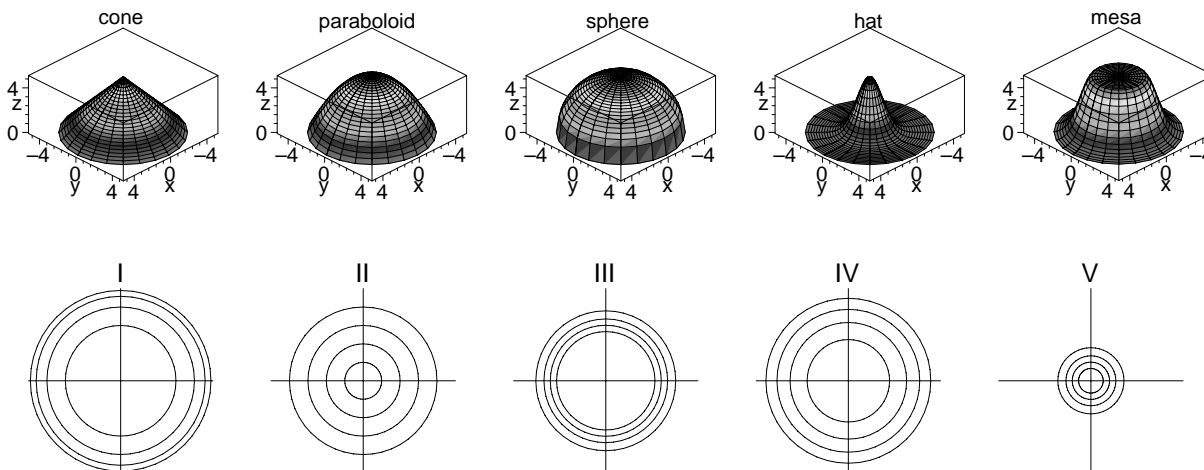


Practice Mini-Test 2 – Calculus 3 – Spring 04

- [Intersections of parametric curves with surfaces (last mini-test did straight lines) and the intersection of two parametric curves (homework and last mini-test did straight lines).] Find the points where the helix  $\vec{r}(t) = \langle 3 \cos t, 3 \sin t, 4t \rangle$  intersects the sphere  $x^2 + y^2 + z^2 = 5^2$ . [compare PMT1 #8 S04]
- T2#1 S03 Show the limit below does not exit.

$$\lim_{(x,y) \rightarrow (0,0)} \frac{y^2}{x^2 + y^2}$$

- T1#5 S03 Match the plot3ds to the contourplots. Each contourplot plots the four contours  $z = 1, 2, 3$  and 4 and each 3d plot is over the disk  $x^2 + y^2 \leq 25$ .



[Compare T1#4 F03 T1#3 F02]

- T1#5 F03 Make sure your TI-89 is in radian mode and use it to do parts (a) & (b) but you must do (c) and (d) by hand.
  - Find the exact answer to  $\int \sin^4 t \cos^3 t dt$ .
  - Plot the curve  $\vec{r}(t) = \langle \cos^4 t, \sin^4 t \rangle$  for  $0 \leq t \leq \pi/2$
  - Find the velocity  $\vec{v}(t)$  of the curve in (b).
  - Find the acceleration  $\vec{a}(t)$  of the curve in (b). and acceleration. [Compare T1#9 S03 T1#7 F02]
- T1#7 F03 Polar coordinates.
  - Convert the polar equation  $r = 2 \cos \theta + 4 \sin \theta$  to rectangular (Cartesian) coordinates and COMPLETELY identify the curve and sketch it.
  - Convert  $1 = x^2 y + y^3$  to polar coordinates, and solve for  $r$ . Simplify. [hint: the answer is some trig function to some power.]
- T1#10 F02 Plot the contour lines for the equation  $x^2 + (y - z)^2 = 4$  for the  $z$  values  $z = 0, 1, 2,$  and  $3$ . Label your contours with the  $z$  values. [Since the equation is not a function  $z = f(x, y)$ , it is ok for the contours to intersect.] On a separate graph give a 3D sketch of the surface and describe the graph in words.

7. T1#10 S03 Catalog of functions. For questions below list all of equations (a)–(h) (see below) that satisfy the given condition, if there are none that satisfy condition then say “none”. [Hint: Sometimes it is easier to say all but “these”, then to list the ones that do.]

- (a) Which are hyperboloids?
- (b) Which are cylinders?
- (c) Which contain the origin?
- (d) Which are unbounded?
- (e) Which intersect the  $y$ -axis?

The list of equations: (Same as the list on the homework problem T1#10 S00 )

- (a)  $x^2 + 4y^2 + 9z^2 = 1$
- (b)  $9x^2 + 4y^2 + z^2 = 1$
- (c)  $x^2 - y^2 + z^2 = 1$
- (d)  $-x^2 + y^2 - z^2 = 1$
- (e)  $y^2 = 2x^2 + z^2$
- (f)  $y = x^2 + 2z^2$
- (g)  $x^2 + 2z^2 = 1$
- (h)  $y = x^2 - z^2$

[Compare T1#6 S02 T1#10 S00]

8. T3#10 S00 Consider the parametric equations for  $0 \leq t \leq \pi$ .
- (I)  $\langle \cos(2t), \sin(2t) \rangle$  (II)  $\langle 2 \cos(t), 2 \sin(t) \rangle$  (III)  $\langle \cos(t/2), \sin(t/2) \rangle$  and (IV)  $\langle 2 \cos(t), -2 \sin(t) \rangle$ .
- (a) Match the equations above with four of the curves  $A, B, C, D, E$  and  $F$  in graph below.
  - (b) Give parametric equations for the curves which have not been matched, again assuming  $0 \leq t \leq \pi$ .

