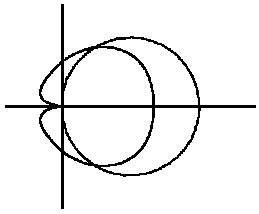
1. (a) $\displaystyle\sum_{n=0}^{\infty}(-1)^n\frac{x^{4n+3}}{(4n+3)(2n+1)!}$ (b) $R=\infty$ (c) $f(1)\simeq 0.31028\pm .0000132$

2. (a) $f(x)=\displaystyle\sum_{n=0}^{\infty}\frac{x^{n+1}}{n!}$ $f'(x)=\displaystyle\sum_{n=0}^{\infty}\frac{(n+1)x^n}{n!}$ (b) $2\,\mathrm{e}$

3. (a) $x=\sin^3 t,\quad y=\cos^3 t-1$ (b) $x^{2/3}+(y+1)^{2/3}=1$ (c) $3/2$

4. (a)



A cardioid and a circle

(b) $(0,0)$; $\left(\text{at }\theta=\dfrac{\pi}{3}\right)\ \left(\dfrac{3}{4},\dfrac{3\sqrt{3}}{4}\right)$; $\left(\text{at }\theta=-\dfrac{\pi}{3}\right)\ \left(\dfrac{3}{4},-\dfrac{3\sqrt{3}}{4}\right)$

(c) π

5. A sphere with radius $=2$, center $(2,0,0)$. (Sketch of sphere with center on the x-axis, touching the origin, left to you!)

6. $\boldsymbol{v}=\langle\cos t-t\sin t\,,\,\sin t+t\cos t\rangle$, $\boldsymbol{a}=\langle-2\sin t-t\cos t\,,\,2\cos t-t\sin t\rangle$, $\boldsymbol{T}(0)=\boldsymbol{i}$, $\boldsymbol{N}(0)=\boldsymbol{j}$, $\kappa(0)=2$

7. (a) The region on and outside the ellipse with center $(0,0)$ and x-intercepts ±1, y-intercepts $\pm\frac{1}{\sqrt{2}}$

   (b) Top half of a hyperboloid with z-axis as central axis. (These are standard sketches.)

8. (a) $x-12y-4z=16$ (b) $-61/7$ (c) $\sqrt{161}$

   (d) $x=-4\,,\ y=-2+t\,,\ z=1-3t$

9. $\displaystyle-\frac{2xz\cos(x^2z)-y\sin x}{x^2\cos(x^2z)-\sec y}$

10. $\frac{\partial p}{\partial x}+\frac{\partial p}{\partial y}+\frac{\partial p}{\partial z}=(f_u-f_w)+(f_v-f_u)+(f_w-f_v)=0$

11. Min at $(0,0)$; saddle points at $(\pm3,3)$.

12. Min distance is $\sqrt{2}$ (at $(2,0,2)$).

13. (a) $2/3$ (b) $\pi(\mathrm{e}^2-1)/8$

14. The solid is an "ice-cream cone". The volume is 8π