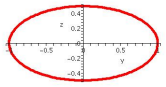
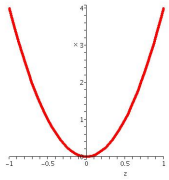
Math 251
Answers to Practice Test 1a

1. See textbook page 562.
2. See textbook page 552.
3. (a)$\langle -2/3, 2/3, -1/3\rangle$, (b) $3\sqrt{17}$.
4. (a) $\sqrt{14}/2$, (b) $x + 3y + 2z = 1$.
5. (a) $y^2 + 4z^2 = 1$ is the ellipse below.



(b) $x = 4z^2$ is the parabola below.



(c) The surface is a paraboloid.

6. [10 points] $\langle -2, 2, \sqrt{2}\rangle\, t + \langle \sqrt{2}, \sqrt{2}, \pi/4\rangle$. (Answer is not unique.)
7. $\frac{\sqrt{2}}{3}e^{-t}$. (This one would be too hard for a test, but it is good practice.)
8. Let $y = 0$, take limit as $x \to 0$. Get 1. Let $y = x$. Take limit as $x \to 0$. Get 2.
9. $f_{xy} = -\sin(xy)\tan(xz^3) - xy\cos(xy)\tan(xz^3) - xz^3\sin(xy)\sec^2(xz^3))$.
   $f_{zz} = 6xz\cos(xy)\sec^2(xz^3) + 18x^2z^4\cos(xy)\sec^2(xz^3)\tan(xz^3)$.
10. $\kappa(x) = 6|x|(1 + 9x^4)^{-3/2}$. Its graph is below.