V63.0123-1 : Calculus III. Final Answers. Spring 2003

1. [10 points]

   Stewart 15.7.7. $(0,0)$ is local min, $(+\sqrt{2}, -1)$ and $(-\sqrt{2}, -1)$ are saddles.

2. [10 points]

   a) product rule and cross of vector with itself is zero. b) chain rule $|\mathbf{r}| \leftarrow (xyz) \leftarrow t$. Use $\frac{\partial}{\partial x}|\mathbf{r}| = x/|\mathbf{r}|$ etc.

3. [10 points]

   $4\pi(8/3 - \sqrt{3})$.

4. [10 points]

   $27\pi/4$.

5. [10 points]

   $\pi/2$.

6. [10 points]

   $1/3$.

7. [10 points]

   a) $(2\sqrt{2} - 1)/3$, b) $1/2$.

8. [10 points]

   $-\pi$ (note sign change due to clockwise).