241 Final Fall 2011 Notes

1. (a) Dot product!
   (b) Project $\bar{c}$ onto $\bar{a}$ and onto $\bar{b}$ to get the two vectors.
   (c) Cross any pair of them to get $\bar{n}$ and use the origin.
2. Take the derivatives and set them equal to 0 to get the critical points. Plug each point into the discriminant (and perhaps f_{xx}) to categorize.
3. This is easiest as the double integral over R of the cone, where R is the disk inside $r = \sin\theta$. Use polar.
4. (a) Take the derivative of $\bar{r}$. Is it ever $\bar{0}$ inside the t-interval or just at the endpoints?
   (b) For the tangent vector just use the formula. For the limit part, skip it, it's way too confusingly worded!
5. (a) The gradient gives you the normal vector and you have the point.
   (b) Easiest is to just take the gradient you got and dot it with this $\bar{u}$.
6. You'll need to solve for x and y here to change the integrand so be careful, it doesn't turn out badly if you're careful. The new region should be a nice rectangle.
7. This is the Divergence Theorem. Know your trig derivatives, the divergence is simple!
8. Green's Theorem! Pretty straightforward with a nice vertically simple region.