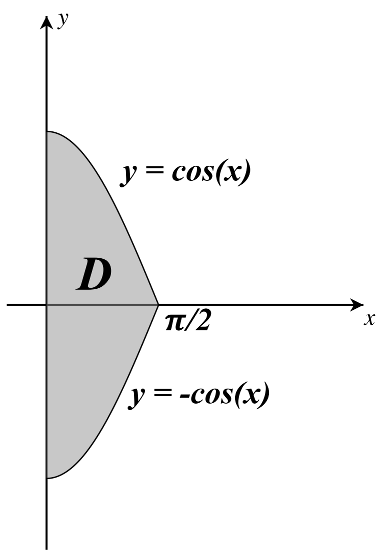
Exam II Answers
Math 126 B & C Autumn 2013

1. (a) $z = \frac{1}{3}(x-2) - \frac{8}{3}(y-1) + 2$
   (b) $f(2.03, 0.97) \approx 2.09$

2. (a) $\mathbf{v}(t) = \langle 2, 2t, t^{-1/2}\rangle$, $\mathbf{a}(t) = \left\langle 0, 2, -\frac{1}{2}t^{-3/2}\right\rangle$
   (b) HINT: We know that $\mathbf{a}(t) = a_N\mathbf{N}(t) + a_T\mathbf{T}(t)$. If acceleration is parallel to the unit normal vector, the tangential component of acceleration must be equal to 0. In particular, since $a_T = \frac{\mathbf{r}'\cdot\mathbf{r}''}{|\mathbf{r}'|}$, we seek the point(s) at which $\mathbf{r}'\cdot\mathbf{r}'' = 0$.
   ANSWER: $\left(0, \frac{1}{4}, \frac{2}{\sqrt{2}}\right)$
   (c) i. $\left(-\frac{1}{2}, 0\right)$
   ii. HINT: Apply the second derivative test: $D\left(-\frac{1}{2}, 0\right) = -2c$. If the critical point gives a saddle point, then $-2c$ must be negative.
   ANSWER: $c > 0$
   (d) HINT: Here is the region over which you're integrating:




ANSWER: $\int_0^{\pi/2}\int_{-\cos x}^{\cos x} e^{\sin x}\,dy\,dx = 2(e-1)$

   (e) HINT: The depth of the pool is a linear function of $x$. At $x = -15$, the depth is 3, and at $x = 15$, the depth is 15. Find the equation for the depth in terms of $x$—you want the integral that gives the volume "under" that depth function over the peanut-shaped region.
   $V = \int_0^{2\pi}\int_0^{10+5\cos(2\theta)} \left(\frac{2}{5}r\cos(\theta) + 9\right) r\,dr\,d\theta$