Math 103.01 Summer 2001
Sample Test #1 Answers

**1.**

**a.** $s = \frac{3}{2}$

**b.** $\mathbf{T}(t) = \sin t\mathbf{i} - \cos t\mathbf{j}$, $\mathbf{N}(t) = \cos t\mathbf{i} + \sin t\mathbf{j}$

**c.** $x - y = 0$

**2.**

**a.** $24x + 24y - z = 80$

**b.** $(0, 0)$, $(1, 1)$, $(-1, -1)$

**3.** $x - 2y + 4z = -1$

**4.** It is the family of all planes parallel to the plane through $(1, 0, 0)$, $(0, 1, 0)$, and $(0, 0, 1)$.

**5.**

**a.** $\lim_{(x,y)\to(0,0)} \dfrac{x^2}{x^2 + y^2}$ does not exist

**b.** $\lim_{(x,y)\to(0,0)} \dfrac{xy}{\sqrt{x^2 + y^2}} = 0$

**6.** $\alpha = -3$

**7.** Let $u = x - y$. Then $\frac{\partial z}{\partial x} = \frac{\partial z}{\partial u}\frac{\partial u}{\partial x}$ and $\frac{\partial z}{\partial y} = \frac{\partial z}{\partial u}\frac{\partial u}{\partial y}$.

But $\frac{\partial u}{\partial x} = 1$ and $\frac{\partial u}{\partial y} = -1$.

Thus, $\frac{\partial z}{\partial x} = \frac{\partial z}{\partial u}$ and $\frac{\partial z}{\partial y} = -\frac{\partial z}{\partial u}$.

Adding yields the result: $\frac{\partial z}{\partial x} + \frac{\partial z}{\partial y} = \frac{\partial z}{\partial u} - \frac{\partial z}{\partial u} = 0$.