

1. (a) $\frac{\langle -3, 2, 2 \rangle}{\sqrt{13}}$
 (b) $\cos \theta = \frac{-8}{\sqrt{338}}$
2. $-4y + 3z = 0$
3. (a) $\mathbf{v}(t) = \langle 3, 6t, 4t + 1 \rangle$
 (b) $|\mathbf{v}(t)| = \sqrt{52t^2 + 8t + 10}$
 (c) $\mathbf{a}(t) = \langle 0, 6, 4 \rangle$
 (d) $r'(t) \times r''(t) = \langle -6, 12, 18 \rangle$ so that

$$\kappa(t) = \frac{|r'(t) \times r''(t)|}{|r'(t)|^3} = \frac{\sqrt{504}}{(52t^2 + 8t + 10)^{3/2}}$$

(e) $\int_0^5 \sqrt{52t^2 + 8t + 10} dt$

4.

$$\begin{aligned} f_x(x, y) &= 2xye^{x^2+y^2} \\ f_y(x, y) &= (1 + 2y^2)e^{x^2+y^2} \\ f_{xy}(x, y) &= 2xe^{x^2+y^2}(1 + 2y^2) \end{aligned}$$

5. (a) $\{(x, y) : x \neq y\}$
 (b) Sketch the curves $x = 0$, $x = -y$ and $y = 0$.
6. Not covered