18.022 Recitation Handout
20 October 2014

1. (3.2.17 in *Colley*) Use the formula

$$\kappa = \frac{\|\mathbf{v} \times \mathbf{a}\|}{\|\mathbf{v}\|^3}$$

to show that if f is C^2 on an interval $[a, b]$ then the curvature of the graph $y = f(x)$ is

$$\kappa = \frac{|f''(x)|}{(1 + (f'(x))^2)^{3/2}}.$$

2. Sketch the vector field $\mathbf{F} = \left(\frac{2x}{x^2+y^2}, -\frac{2y}{x^2+y^2}\right)$.

3. Find the divergence and curl of $\mathbf{F} = (2x^2, xe^z, -4y)$.

4. Let $f(x, y) = \log(x^2 + y^2)$ for $(x, y) \in \mathbb{R}^2 \setminus \{(0, 0)\}$. Show that $\nabla \cdot (\nabla f) = 0$.