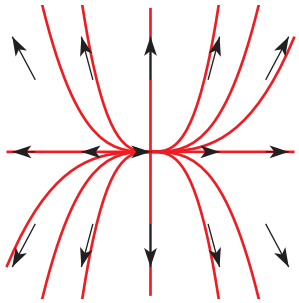
MATHEMATICS 317 April 2001 Final Exam Answers

1. The field lines obey $y = C'x^3$ for any nonzero constant C'. $x = 0$ and $y = 0$ are also field lines.



2. (a) $\frac{23}{15} = 1.5\dot{3}$ (b) $\frac{2}{3}\left[14^{3/2} - 1\right] \approx 34.26$ (c) $\sin 1 + \frac{3}{2} \approx 2.3415$

3. $\int_S \mathbf{F} \cdot \hat{n}\, \mathrm{d}S = 2\pi$

4. $\iint_S \mathbf{F} \cdot \hat{\mathbf{n}}\, \mathrm{d}S = 12\pi$

5. $\oint_{\mathcal{C}_1} \mathbf{F} \cdot \mathrm{d}\mathbf{r} = 0$ $\oint_{\mathcal{C}_2} \mathbf{F} \cdot \mathrm{d}\mathbf{r} = 2\pi$

6. $\oint_{\mathcal{C}} \mathbf{F} \cdot \mathrm{d}\mathbf{r} = \pi$

7. (a) True (b) False (c) True