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| MATH 2242-090 — Spring 2016 — Dr. Clontz — Quiz 5 |
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Name: _____

- Each quiz question is labeled with its worth toward your total quiz grade for the semester.
- On multiple choice problems, you do not need to show your work. No partial credit will be given.
- On full response problems, show all of your work and give a complete solution. When in doubt, don't skip any steps. Partial credit will be given at the discretion of the professor.
- This quiz is open notes and open book.
- This quiz is due at the end of class. Quizzes submitted over one minute late will be penalized by 50%.

1. (10 points) Prove that $\mathbf{c}(t) = (t^2, 2t - 1, \sqrt{t})$ is a flow line for the vector field $\mathbf{F}(x, y, z) = (y + 1, 2, \frac{1}{2z})$.

2. (10 points) For $f : \mathbb{R}^2 \rightarrow \mathbb{R}$ and $\mathbf{F} : \mathbb{R}^2 \rightarrow \mathbb{R}^2$, prove that $\operatorname{div}(f\mathbf{F}) = f \operatorname{div} \mathbf{F} + \mathbf{F} \cdot \nabla f$.
(Hint: $f\mathbf{F} = (fF_1, fF_2)$, so use the product rule to compute $\frac{\partial}{\partial x}[fF_1]$ and $\frac{\partial}{\partial y}[fF_2]$.)