This coursework will contribute 5% of the marks for ELEC2212 Electromagnetism for Communications. Submit your answers via handin.ecs.soton.ac.uk by **5 pm on Monday 29 October 2018**. On the top of the first page of your answer, specify **your name, student number and university user name**, or you will risk of getting no mark. The answers will be discussed in the tutorial on Wednesday 31 October 2018, and the marked answer sheets will be returned within two weeks.

(1) Calculate the value of $(\hat{x} + 2\hat{y} + 4\hat{z}) \cdot [(2\hat{x} + 3\hat{y} - 2\hat{z}) \times (3\hat{x} - 2\hat{y} - 2\hat{z})]$, where $\hat{x}$, $\hat{y}$ and $\hat{z}$ are the unit vectors in $+x$, $+y$ and $+z$ directions, respectively.  

(2) Calculate $[\nabla(x^2 + xy + z)] + [\nabla \times (xy\hat{x} - 2y^2\hat{y} - xy\hat{z})]$.  

(3) Calculate the value of $\nabla \times (\nabla T)$, where $T$ is an arbitrary scalar field.  

(4) Calculate the line integral of function $\vec{V} = x^2\hat{x} + 2xy\hat{y} + y^2\hat{z}$ from $(x,y,z) = (0,0,0)$ to $(1, -1,1)$ by this route $(0,0,0) \rightarrow (1,0,0) \rightarrow (1,-1,0) \rightarrow (1,-1,1)$.  

(5) Calculate the volume integral of function $T = xy^2 + 2yz^2$ for a cube given by $-1 \leq x \leq 1$, $-1 \leq y \leq 1$ and $-1 \leq z \leq 1$.  

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