微積分A下(統計系)預習測驗 #18

姓名:_____ 系級:_____ 學號_____

預習第17章第2節(pp. 1098-1107), 然後回答下列問題

1. Line Integral of a Scalar Field

   (a) Write the definition of the line integral of a scalar field $f(x, y, z)$ over a smooth curve $C : \mathbf{r}(t) = x(t)\,\mathbf{i} + y(t)\,\mathbf{j} + z(t)\,\mathbf{k}, \quad a \le t \le b$ (Formula 9, page 1103)

   (b) It can be written in a more compact vector notation as (Bottom of page 1103)

2. Line Integral of a Vector Field

   (a) Write the definition of the line integral of a vector field $\mathbf{F}(x, y, z)$ over a smooth curve $C : \mathbf{r}(t) = x(t)\,\mathbf{i} + y(t)\,\mathbf{j} + z(t)\,\mathbf{k}, \quad a \le t \le b$ (Formula 13, page 1106)

   (b) If $\mathbf{F}$ is a force field, what does this line integral represent? (page 1105)

   (c) If $\mathbf{F} = P\,\mathbf{i} + Q\,\mathbf{j} + R\,\mathbf{k}$, what is the connection between the line integral of $\mathbf{F}$ and the line integrals of the component functions P, Q, and R? (Red box, page 1107)