The conditions on the 2nd page are numbered 1-10. The numbers on this page direct you to the matching condition.

Statement The line integral of $\mathbf{F}$ along C is $\int_C F \cdot d\mathbf{r} = \int_a^b F(\mathbf{r}(t)) \cdot \mathbf{r}'(t)\, dt = \int_C \mathbf{F} \cdot \mathbf{T} ds.$ 10

Statement $\mathbf{F}$ is a conservative vector field. 3

Statement $\int_C \nabla f \cdot d\mathbf{r} = f(\mathbf{r}(b)) = f(\mathbf{r}(a))$ 5

Statement $\mathbf{F}$ is a conservative vector field on D; that is, there exists a function f such that $\nabla f = \mathbf{F}$.

2

Statement Throughout D we have $\frac{\partial P}{\partial y} = \frac{\partial Q}{\partial x}$. 4

Statement $\mathbf{F}$ is conservative.

1

Statement div curl $\mathbf{F} = 0$.

7

Statement The surface area of S is $A(S) = \iint_D |r_u \times r_v| dA$ where $r_u = \langle \frac{\partial x}{\partial u}, \frac{\partial y}{\partial u}, \frac{\partial z}{\partial u} \rangle$ $r_v = \langle \frac{\partial x}{\partial v}, \frac{\partial y}{\partial v}, \frac{\partial z}{\partial v} \rangle$.

8

Statement $\int_C P\, dx + Q\, dy = \iint_D \left(\frac{\partial Q}{\partial x} - \frac{\partial P}{\partial y} \right) dA.$

6

Statement curl $\nabla f = 0$

9

1 **Condition** $\mathbf{F}$ is a vector field defined on all of $\mathbb{R}^3$ whose component functions have continuous partial derivatives and curl $\mathbf{F} = 0$.

2 **Condition** Let $\mathbf{F}(x,y) = P(x,y)\mathbf{i} + Q(x,y)\mathbf{j}$ be a vector field on an open simply-connected region D. Suppose that P and Q have continuous first-order derivatives and $\frac{\partial P}{\partial y} = \frac{\partial Q}{\partial x}$ throughout D.

3 **Condition** Suppose $\mathbf{F}$ is a vector field that is continuous on an open connected region D. $\int_C \mathbf{F} \cdot d\mathbf{r}$ is independent of path in D.

4 **Condition** $\mathbf{F} = P\mathbf{i} + Q\mathbf{j} + R\mathbf{k}$ is a vector field on $\mathbb{R}^3$ and P, Q, and R have continuous second-order partial derivatives.

5 **Condition** Let C be a smooth curve given by the vector function $\mathbf{r}(t)$, $a \le t \le b$. Let f be a differentiable function of two or three variables whose gradient vector ∇f is continuous on C.

6 **Condition** Let C be a positively oriented, piecewise-smooth, simple closed curve in the plane and let D be the region bounded by C. P and Q have continuous partial derivatives on an open region that contains D.

7 **Condition** $\mathbf{F}(x,y) = P(x,y)\mathbf{i} + Q(x,y)\mathbf{j}$ is a conservative vector field, where P and Q have continuous first-order partial derivatives on a domain D.

8 **Condition** A smooth parametric surface S is given by the equation $\mathbf{r}(u,v) = x(u,v)\mathbf{i} + y(u,v)\mathbf{j} + z(u,v)\mathbf{k}$, $(u,v) \in D$, and S is covered just once as (u,v) ranges throughout the parameter domain D.

9 **Condition** f is a function of three variables that has continuous second-order partial derivatives.

10 **Condition** Let $\mathbf{F}$ be a continuous vector field defined on a smooth curve C given by a vector function $\mathbf{r}(t)$, $a \le t \le b$.