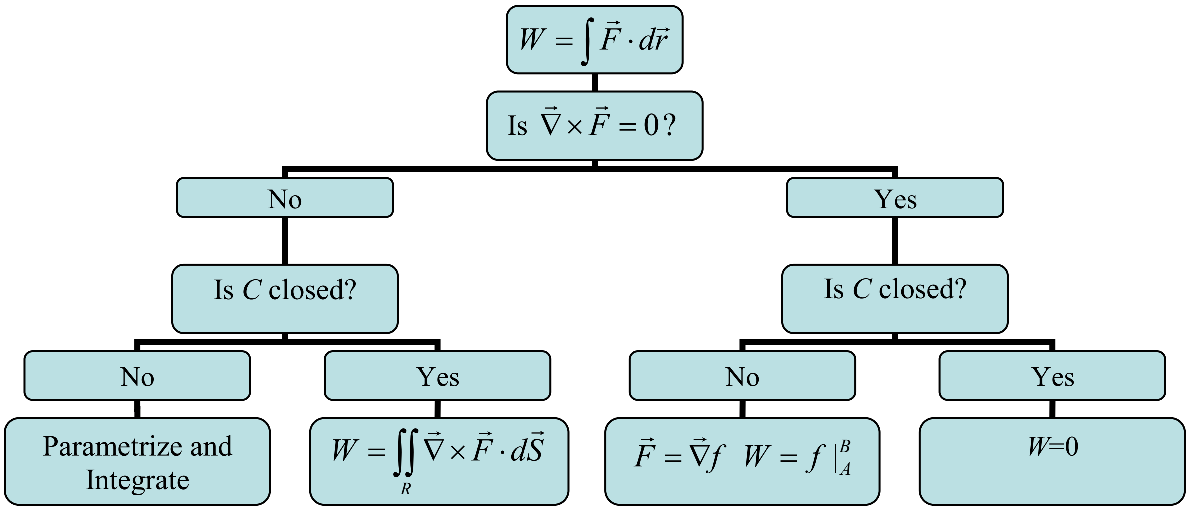
Hints on Line Itegrals



Case 1. Parametrize and Integrate

a) C is a line joining A and B: Use $\vec{r}(t) = \vec{A} + t(\vec{B} - \vec{A})$
b) C is a circle: Use $r(t) = (a\cos t)\vec{i} + (a\cos t)\vec{j} + (c)\vec{k}$
c) C is an Ellipse: Use $r(t) = (a\cos t)\vec{i} + (b\cos t)\vec{j} + (c)\vec{k}$
d) C is a Hyperbola: Use $r(t) = (a\cosh t)\vec{i} + (b\cosh t)\vec{j} + (c)\vec{k}$
e) C is a Parabola: Use $r(t) = (t)\vec{i} + (at^2 + bt + c)\vec{j}$
f) C is a Helix: Use $r(t) = (a\cos t)\vec{i} + (a\cos t)\vec{j} + (ct)\vec{k}$
g) C is given by y=f(x). Use $r(t) = (t)\vec{i} + f(t)\vec{j}$

Case 2. Stoke's Theorem

a) In R^2, Stoke's Theorem is called Green's Theorem. You might as well do every problem referring to Green's Theorem by using the general Stoke's theorem formula.
b) In the xy plane , if F=<P,Q,0>, then ∇ X F=<0,0, Q_y-P_x>
c) In the xy plane , dS = <0,0,dx dy>, so $W = \iint_R \vec{\nabla} \times \vec{F} \cdot d\vec{S} = \iint_R (Q_y - P_x)dxdy$
d) In the xz plane, $d\vec{S} = (dx)\vec{i} \times (dz)\vec{k} = -(dxdz)\vec{j}$
e) In the yz plane, $d\vec{S} = (dy)\vec{j} \times (dz)\vec{k} = (dydz)\vec{i}$

Case 3. Easy. Find the potential *f* and evaluate at the end points.