(1) Sketch the vector field $\vec{F}(x, y) = (x + y)\hat{i} + (x - y)\hat{j}$, paying special attention to arrows on the coordinate axes, as well as on the lines $y = \pm x$.

Along the positive $x$-axis, arrows are pointing to the northeast, getting longer as $x$ moves eastward.
Along the negative $x$-axis, the arrows are pointing to the southwest, getting longer as $x$ moves westward.
Along the positive $y$-axis, arrows are pointing to the southeast, getting longer as $y$ moves north.
Along the negative $y$-axis, arrows are pointing to the northwest, getting longer as $y$ moves south.
Along the $y = x$ curve, $x \geq 0$, arrows are pointing to the east, increasing in length as the point moves to the northeast.
Along the $y = x$ curve, $x \leq 0$, arrows are pointing to the west, increasing in length as the point moves to the southwest.
Along the $y = -x$ curve, $x \geq 0$, arrows are pointing to the north, increasing in length as the point moves to the southeast.
Along the $y = -x$ curve, $x \leq 0$, arrows are pointing to the south, increasing in length as the point moves to the northwest.

(2) Calculate $\int_{C} (y\hat{i} - x\hat{j}) \cdot d\vec{r}$, where $C$ is the circular arc in the first quadrant, going from $\langle 1, 0 \rangle$ to $\langle 0, 1 \rangle$.

This integral may also be written $\int_{C} y \, dx - x \, dy$, where $x = \cos t$ and $y = \sin t$, $0 \leq t \leq \pi/2$. Then $dx = -\sin t \, dt$ and $dy = \cos t \, dt$; hence $\int_{C} y \, dx - x \, dy = \int_{0}^{\pi/2} (-\sin^2 t - \cos^2 t) \, dt = -\int_{0}^{\pi/2} (\sin^2 t + \cos^2 t) \, dt = -\int_{0}^{\pi/2} 1 \, dt = -\pi/2$. 