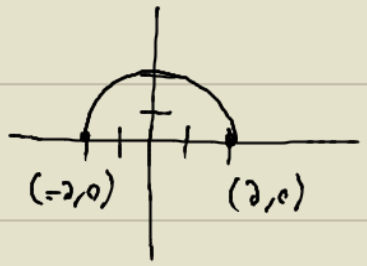
7. $\int_C (x^2+y^2)\,ds$



$\vec{r}(t) = \underbrace{2\cos t}_{x(t)}\vec{i} + \underbrace{2\sin t}_{y(t)}\vec{j} \qquad 0 \le t \le \pi$

$f(x,y) = x^2+y^2$

$f(x(t),y(t)) = (2\cos t)^2 + (2\sin t)^2$

$= 4\cos^2 t + 4\sin^2 t$

$= 4(\cos^2 t + \sin^2 t)$

$= 4$

$x'(t) = -2\sin t \qquad y'(t) = 2\cos t$

$= \int_0^{\pi} 4\sqrt{(-2\sin t)^2 + (2\cos t)^2}\,dt$

$= 4\int_0^{\pi} \sqrt{4\sin^2 t + 4\cos^2 t}\,dt$

$= 4\int_0^{\pi} \sqrt{4(\sin^2 t + \cos^2 t)}\,dt$

$= 4\int_0^{\pi} \sqrt{4}\,dt$

$= 4 \cdot 2\,[t]_0^{\pi}$

$= 8[\pi - 0]$

$= \boxed{8\pi}$

$x^2+y^2 = 4$

$\frac{x^2}{4} + \frac{y^2}{4} = 1$

$\frac{1}{4}x^2 + \frac{1}{4}y^2 = 1$

$\left(\frac{1}{2}x\right)^2 + \left(\frac{1}{2}y\right)^2 = 1$

$(\cos t)^2 + (\sin t)^2 = 1$

$\frac{1}{2}x = \cos t \qquad \frac{1}{2}y = \sin t$

$x = 2\cos t \qquad y = 2\sin t$

$(2,0)$ $\qquad$ $(-2,0)$

$x \quad y$

$\cos t = \frac{1}{2}x = 1 \qquad \cos t = \frac{1}{2}x = -1$

$\sin t = \frac{1}{2}y = 0 \qquad \sin t = \frac{1}{2}y = 0$

$(1,0) \qquad (-1,0)$

$t = 0 \quad$ TO $\quad t = \pi$