

Homework #7

16.2.9 | $C: x = 4 \sin t, y = 4 \cos t, z = 3t, 0 \leq t \leq \pi/2$

$x' = 4 \cos t, y' = -4 \sin t, z' = 3$

$\sqrt{x'^2 + y'^2 + z'^2} = 5$

$\int_C xy^3 ds = \int_0^{\pi/2} (4 \sin t)(4 \cos t)^3 \sqrt{x'^2 + y'^2 + z'^2} dt$

$= \int_0^{\pi/2} 256 \cos^3 t \sin t dt$

$= 1280 \int_0^{\pi/2} \cos^3 t \sin t dt$

$u = \cos t$
 $du = -\sin t dt$

$= 1280 \int_1^0 -u^3 du$

$= \frac{1280}{4} = 320$

16.2.19 | $\vec{F}(x,y) = \langle x^2 y^3, -y \sqrt{x} \rangle$

$\vec{r}(t) = \langle t^2, -t^3 \rangle, 0 \leq t \leq 1$

$\vec{r}'(t) = \langle 2t, -3t^2 \rangle$

Along $\vec{r}(t)$,

$\vec{F}(\vec{r}(t)) = \langle -t^3, t^4 \rangle$

$\int_C \vec{F} \cdot d\vec{r} = \int_0^1 \vec{F}(\vec{r}(t)) \cdot \vec{r}'(t) dt$

$= \int_0^1 (-2t^4 - 3t^6) dt$

$= \left[-\frac{2}{5} t^5 - \frac{3}{7} t^7 \right]_0^1$

$= -\frac{54}{105}$