$\int \vec{F} \cdot d\vec{r} \qquad \vec{F} = (-2\sin x, -2\cos y, xz)$

$\vec{r}(t) = (\underbrace{2t^3}_{x}, \underbrace{-t^2}_{y}, \underbrace{-3t}_{z}) \qquad t = 0$ to 1

$d\vec{r} = (6t^2, -2t, -3)\, dt$

$\vec{F}(t) = (-2\sin(2t^3), -2\cos(-t^2), -6t^4)$

$\vec{F} \cdot d\vec{r} = (-2\sin(2t^3), -2\cos(-t^2), -6t^4) \cdot (6t^2, -2t, -3)\, dt$

$= (-12t^2 \sin(2t^3) + 4t\cos(-t^2) + 18t^4)\, dt$

Do each term indivsdually

① $\int -12t^2 \sin t^3\, dt = \int_0^1 -4\sin(t^3)\, dt^3 = 4\cos t^3 \Big|_0^1$

② $\int 4t\cos(-t^2)\, dt = \int 2\cos(-t^2)\, dt^2 = 2\sin(-t^2)\Big|_0^1$

③ $\int 18t^4\, dt = \frac{18}{5} t^5 \Big|_0^1 = 18/5$

① $= 4[\cos(1) - 1]$ ② $= 2\sin(-1) = -2\sin(1)$

Total $= 4(\cos(1) - 1) - 2\sin(1) + \underbrace{18/5}_{3.6}$

$(\cos(1) = 0.5403 \qquad \sin(1) = \cancel{8.4}\ 0.8415)$

$4(0.5403 - 1) - 2(0.8415) + 3.6 =$
$-1.8388 - 1.6830 + 3.6 = 0.0782$