Math 18, Solutions to selected HW problems, §7.2, due 11/15

2a, 2d, 12

(2a) $\int_0^{2\pi} \left(\cos t \cdot \cos t - \sin t(-\sin t) \right) dt$

$= \int_0^{2\pi} (\cos^2 t + \sin^2 t)\, dt = \int_0^{2\pi} 1\, dt = 2\pi$

(2d) parametrize: $x = t,\ y = 0,\ z = t^2, \quad -1 \le t \le 1$

$\int_{-1}^{1} (t^2 \cdot 1 - t \cdot 0 \cdot 0 + 2t)\, dt = \int_{-1}^{1} (t^2 + 2t)\, dt = \frac{1}{3}t^3 + t^2 \Big|_{-1}^{1}$

$= \frac{1}{3} + 1 - \left(\frac{-1}{3} + 1\right) = \frac{2}{3}$

(12) We could set up the four line integrals corresponding to the four sides of the square, or we could notice that

$F = \nabla f$, where $f(x,y,z) = xz^3 + x^2 y$

The line integral of a gradient vector field around a closed curve is 0.