HW 17.1 # 1, 3, 5, 7, 9, 13 due 12/06

1.) $\int_0^{2\pi}\int_0^1 -x \, dx\, dy = \int_0^{2\pi} -\frac{1}{2} \, dy = -\pi$

3.) $\int_0^1\int_0^1 2x - 2y \, dx\, dy = \int_0^1 1 \, dy = 1$

5.) $\int_0^{2\pi}\int_0^1 -x^2 \, dx\, dy = \int_0^{2\pi} -\frac{1}{3} \, dy = -\frac{2\pi}{3}$

7.) $\int_0^1\int_x^{x^2} 2x \, dy\, dx = \int_0^1 2x^3 - 2x^2 \, dx = \frac{x^4}{2} - \frac{2x^3}{3} \Big|_0^1 = \frac{1}{2} - \frac{2}{3} = -\frac{1}{6}$

9.) left: $y = x$ right: $y = x - 2$ top: $y = 2$ bot: $y = 0$

$\int_0^2\int_y^{y+2} -e^{x-y} - e^{(x-y)} \, dx\, dy = \int_0^2 -2e^2 + 2 \, dy = -4e^2 + 4$

13.) left $x = 0$, right $x = 2$, top: $y = 6 - x$, bott: $y = x$

$\int_0^2\int_x^{6-x} 2 \, dy\, dx = \int_0^2 12 - 4x \, dx = 12x - 2x^2 \Big|_0^2 = 16$

$\int_0^6 y \, dy = \frac{y^2}{2}\Big|_0^6 = 18$ $16 - 18 = -2$

Scanned with CamScanner

HW 17.2 # 1, 3, 5, 9, 11, 13 due 12/06

1.) $r = \langle \cos t, \sin t, 0 \rangle \quad 0 \le t \le 2\pi$

$r' = \langle -\sin t, \cos t, 0 \rangle$

$F = \langle 2\sin t\cos t, \cos t, \sin t \rangle$

$\int_0^{2\pi} -2\sin t\cos^2 t + \sin t\cos t \, dt$

$= 1.022$

$$\text{curl } F = \begin{vmatrix} i & j & k \\ d/dx & d/dy & d/dz \\ 2xy & x & y+z \end{vmatrix}$$

$\text{curl} F = \langle 1, 0, 1-2x \rangle = \langle 1, 0, 1-2\cos t \rangle$

3.) $\text{curl } F = \langle 0, -e^{y-z}, -e^{y-z} \rangle \quad z = 1$

$= \langle 0, -e^{y-1}, -e^{y-1} \rangle$

$\int_0^1 \int_0^1 -e^{y-1} \, dx\,dy = \int_0^1 -e^{y-1} \, dy = -e^{y-1} \Big|_0^1 = -1 + \frac{1}{e} = \frac{1-e}{e}$

5.) $x = \cos t, y = \sin t, z = 0 \quad 0 \le t \le 2\pi$

$F = \langle 1 - \sin t, 1 + \cos t, 1 \rangle \quad dr = \langle -\sin t, \cos t, 0 \rangle$

$\int_0^{2\pi} \langle 1 - \sin t, 1 + \cos t, 1 \rangle \cdot \langle -\sin t, \cos t, 0 \rangle \, dt$

$\int_0^{2\pi} -\sin t + \sin^2 t + \cos t + \cos^2 t \, dt = \int_0^{2\pi} \cos t - \sin t \, dt = -\sin t + \cos t \Big|_0^{2\pi}$

$= 1 - 1 = 0$

9.) $x = \cos t, y = \sin t, \quad 1 \le z \le 4$

$\int_0^{2\pi} \langle 4\sin t, 4\cos t, \cos t\sin t \rangle \cdot \langle -\sin t, \cos t, 0 \rangle \, dt - \int_0^{2\pi} \langle \sin t, \cos t, \cos t \sin t \rangle \cdot \langle -\sin t, \cos t, 0 \rangle$

$=$

11.) $x = 3\cos t, y = 3\sin t, z = 2$

$\int_0^{2\pi} \langle 9\sin t, -6\cos t, 9\sin t \rangle \cdot \langle -3\sin t, 3\cos t, 0 \rangle \, dt =$

13.) ???