1.) a)

b)   c)   d)

3.) NO ?   a) b) c) d)

13.) $G(u,v) = (3u + 4v, u - 2v)$

$|J| = |(3)(-2) - (4)(1)| = |-10| = 10$

15.) $G(r,t) = (r \sin t, r - \cos t)$, $(r,t) = (1, \pi)$

$|J| = |(\sin t)(r + \sin t) - (r \cos t)(1)| = |(0)(1 + 0) - (1 \cdot -1)(1)| = |0 + 1| = 1$

17.) $G(r, \theta) = (r\cos\theta, r\sin\theta)$, $(r, \theta) = (4, \pi/6)$

$|J| = (\cos\theta)(r\cos\theta) - (-r\sin\theta)(\sin\theta) = (\frac{\sqrt{3}}{2})(2\sqrt{3}) - (-2)(\frac{1}{2}) = 3 + 1 = 4$

19.) ?

23.) a. $x = 3u + v$, $y = u - 2v$, $J = (3)(-2) - (1)(1) = |-7| = 7$
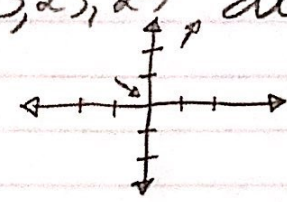
$R = [0,3] \times [0,5]$

area $G(R) = 7 \times 5 \times 3 = 105$
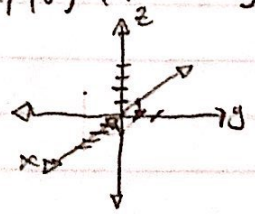
b. $R = [2,5] \times [1,7]$

area $G(R) = 7 \times 6 \times 3 = 126$
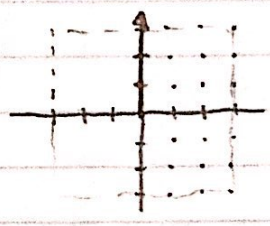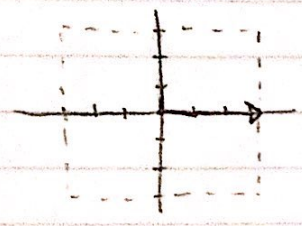
HW 16.1 # 1, 3, 5, 7, 9, 11, 17, 23, 25, 27, due 11/08

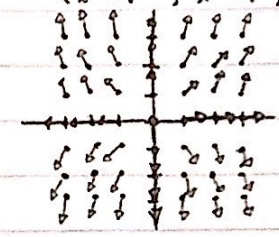1.) $P = (1,2)$, $Q = (-1,-1)$, $F = \langle x^2, x \rangle$

3.) $P = (0,1,1)$, $Q = (2,1,0)$, $F = \langle xy, z^2, x \rangle$

5.) $F = \langle 1, 0 \rangle$ 7.) $F = x\,\hat{\imath}$ 9.) $F = \langle 0, x \rangle$ 11.) $F = \left\langle \frac{x}{x^2 + y^2}, \frac{y}{x^2 + y^2} \right\rangle$

17.) $F = \langle 1, 1, 1 \rangle \to C$

23.) $F = \langle xy, yz, y^2 - x^3 \rangle$

$\mathrm{div}(F) = \langle y, z, 0 \rangle \cdot \langle xy, yz, y^2 - x^3 \rangle = xy^2 + yz^2$

$\mathrm{curl}(F) = \langle 2y^2 - zx^3, x^3 - y^3, 2y^2 - xyz \rangle$

25.) $F = \langle x - 2zx^2, z - xy, z^2x^2 \rangle$

$\mathrm{div}(F) = \langle 1 - 4zx, -x, 2zx^2 \rangle \cdot \langle x - 2zx^2, z - xy, z^2x^2 \rangle = (1 - 4zx)(x - 2zx^2) + (x^2y - zx) +$
$(2zx^2)(z^2x^2)$

$\mathrm{curl}(F) = \langle -z^2x^3 - (2zx^2)(z - xy), (2zx^2)(x - 2zx^2) - (1 - 4zx)(z^2x^2), (1 - 4zx)(z - xy) + x(x - 2zx^2) \rangle$

27.) $F = \langle z - y^2, x + z^3, y + x^2 \rangle$

$\mathrm{div}(F) = \langle 0, 0, 0 \rangle \cdot \langle z - y^2, x + z^3, y + x^2 \rangle = 0$

$\mathrm{curl}(F) = \langle 0, 0, 0 \rangle$