```
ClearAll[ux, ν, x, y];

uy[ν_, x_, y_] = (4 * ν - 2) * y / (x^2 + y^2) + (x^2 * y - y^3) / (x^2 + y^2)^2
```

$$\frac{x^2\,y - y^3}{(x^2+y^2)^2} + \frac{y\,(-2+4\,\nu)}{x^2+y^2}$$

```
ux[ν_, x_, y_] = (x^3 - x * y^2) / (x^2 + y^2)^2
```

$$\frac{x^3 - x\,y^2}{(x^2+y^2)^2}$$

```
Needs["VectorFieldPlots`"]
```

Get::noopen : Cannot open VectorFieldPlots`. More…

Needs::nocont : Context VectorFieldPlots` was not created when Needs was evaluated. More…

$Failed

```
VectorFieldPlot[{ux[0.3, x, y], uy[0.3, x, y]}, {x, 1, 3}, {y, 0, 1}]
```

$$\text{VectorFieldPlot}\left[\left\{\frac{x^3 - x\,y^2}{(x^2+y^2)^2},\ -\frac{0.8\,y}{x^2+y^2} + \frac{x^2\,y - y^3}{(x^2+y^2)^2}\right\},\ \{x, 1, 3\},\ \{y, 0, 1\}\right]$$

```
ϵxx = D[ux[ν, x, y], {x, 1}]
```

$$\frac{3\,x^2 - y^2}{(x^2+y^2)^2} - \frac{4\,x\,(x^3 - x\,y^2)}{(x^2+y^2)^3}$$

```
ϵyy = D[uy[ν, x, y], {y, 1}]
```

$$\frac{x^2 - 3\,y^2}{(x^2+y^2)^2} - \frac{4\,y\,(x^2\,y - y^3)}{(x^2+y^2)^3} - \frac{2\,y^2\,(-2+4\,\nu)}{(x^2+y^2)^2} + \frac{-2+4\,\nu}{x^2+y^2}$$

```
ϵxy = (D[uy[ν, x, y], {x, 1}] + D[ux[ν, x, y], {y, 1}]) / 2
```

$$\frac{1}{2}\left(-\frac{4\,y\,(x^3 - x\,y^2)}{(x^2+y^2)^3} - \frac{4\,x\,(x^2\,y - y^3)}{(x^2+y^2)^3} - \frac{2\,x\,y\,(-2+4\,\nu)}{(x^2+y^2)^2}\right)$$

```
σyy = ν / (1 - 2 * ν) * (ϵxx + ϵyy) + ϵyy
```

$$\frac{x^2 - 3\,y^2}{(x^2+y^2)^2} - \frac{4\,y\,(x^2\,y - y^3)}{(x^2+y^2)^3} - \frac{2\,y^2\,(-2+4\,\nu)}{(x^2+y^2)^2} + \frac{-2+4\,\nu}{x^2+y^2} + \frac{\nu\left(\frac{x^2-3\,y^2}{(x^2+y^2)^2} + \frac{3\,x^2-y^2}{(x^2+y^2)^2} - \frac{4\,x\,(x^3-x\,y^2)}{(x^2+y^2)^3} - \frac{4\,y\,(x^2\,y-y^3)}{(x^2+y^2)^3} - \frac{2\,y^2\,(-2+4\,\nu)}{(x^2+y^2)^2} + \frac{-2+4\,\nu}{x^2+y^2}\right)}{1 - 2\,\nu}$$

```
y = 0;

Simplify[σyy]
```

$$\frac{-1 + 2\,\nu}{x^2}$$

```
ClearAll[ux, uy, ν, x, y];
```

```
phi = -2 * π * R^2 * Log[Sqrt[x^2 + y^2]]
```

$$-2\,\pi\,R^2\,\text{Log}\left[\sqrt{x^2+y^2}\,\right]$$

```
psi = π * R^2 * (x^2 + y^2) * (1 - Log[Sqrt[x^2 + y^2]])
```

$$\pi\,R^2\,(x^2+y^2)\,\left(1-\text{Log}\left[\sqrt{x^2+y^2}\,\right]\right)$$

```
Simplify[D[psi, {y, 2}] + D[psi, {x, 2}] - 2 * phi]
```

0

```
ux = Simplify[D[psi, x, x, y] / 4 / π / (1 - ν) - D[phi, y] / 2 / π]
```

$$\frac{R^2\,y\,(x^2\,(-3+2\,\nu)+y^2\,(-1+2\,\nu))}{2\,(x^2+y^2)^2\,(-1+\nu)}$$

```
uy = Simplify[D[psi, y, x, y] / 4 / π / (1 - ν) - D[phi, x] / 2 / π]
```

$$\frac{R^2\,x\,(y^2\,(-3+2\,\nu)+x^2\,(-1+2\,\nu))}{2\,(x^2+y^2)^2\,(-1+\nu)}$$

```
ϵxx = Simplify[D[ux, x]]
```

$$-\frac{R^2\,x\,y\,(x^2\,(-3+2\,\nu)+y^2\,(1+2\,\nu))}{(x^2+y^2)^3\,(-1+\nu)}$$

```
ϵyy = Simplify[D[uy, y]]
```

$$-\frac{R^2\,x\,y\,(y^2\,(-3+2\,\nu)+x^2\,(1+2\,\nu))}{(x^2+y^2)^3\,(-1+\nu)}$$

```
ϵxy = Simplify[(D[uy, x] + D[ux, y]) / 2]
```

$$-\frac{R^2\,(x^4-6\,x^2\,y^2+y^4)}{2\,(x^2+y^2)^3\,(-1+\nu)}$$

```
σyy = Simplify[2 * ν / (1 - 2 * ν) * (ϵxx + ϵyy) + 2 * ϵyy]
```

$$-\frac{2\,R^2\,x\,y\,(x^2-3\,y^2)}{(x^2+y^2)^3\,(-1+\nu)}$$

```
y = 0;
```

```
Simplify[σyy]
```

$$\frac{R^2\,(1-2\,\nu)}{4\,x^2\,(-1+\nu)}$$