

```
(%i1) kill(all);
(%o0) done
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## 1 Eqs.(24,25)

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(%i1) E22: dx = cos(theta)*dr-r*sin(theta)*dtheta;
(%o1) dx=dr cos(theta)-dtheta r sin(theta)
```

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(%i2) E23: dy = sin(theta)*dr+r*cos(theta)*dtheta;
(%o2) dy=dr sin(theta)+dtheta r cos(theta)
```

```
(%i3) trigsimp(solve([E22,E23], [dr,dtheta]));
(%o3) [[dr=dy sin(theta)+dx cos(theta), dtheta=-\frac{dx sin(theta)-dy cos(theta)}{r}]]
```

## 2 Eq.(35)

```
(%i4) depends(psi, theta);
(%o4) [\Psi(\theta)]
```

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(%i5) E35: -h[bar]^2/(2*m*rB^2)*diff(psi,theta,2) = (k/rB+E)*psi;
(%o5) -\frac{h_{bar}^2 \left( \frac{d^2}{d\theta^2} \Psi \right)}{2 m rB^2} = \Psi \left( \frac{k}{rB} + E \right)
```

```
(%i6) E: -m*k^2/(2*n^2*h[bar]^2);
(%o6) -\frac{k^2 m}{2 h_{bar}^2 n^2}
```

```
(%i7) E35a: ev(E35);
(%o7) -\frac{h_{bar}^2 \left( \frac{d^2}{d\theta^2} \Psi \right)}{2 m rB^2} = \Psi \left( \frac{k}{rB} - \frac{k^2 m}{2 h_{bar}^2 n^2} \right)
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```
(%i8) E35b: solve(E35a, diff(psi,theta,2));
(%o8) [\frac{d^2}{d\theta^2} \Psi = \frac{k^2 m^2 \Psi rB^2 - 2 h_{bar}^2 k m n^2 \Psi rB}{h_{bar}^4 n^2}]
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```
(%i9) E35c: expand(E35b);
(%o9) [\frac{d^2}{d\theta^2} \Psi = \frac{k^2 m^2 \Psi rB^2}{h_{bar}^4 n^2} - \frac{2 k m \Psi rB}{h_{bar}^2}]
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```
(%i10) rB: h[bar]/(m*c)*n^2/alpha[f];
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```
(%o10) 
$$\frac{h_{bar} n^2}{c \alpha_f m}$$

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(%i11) alpha[f]: k/(h[bar]*c);
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(%o11) 
$$\frac{k}{h_{bar} c}$$

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```
(%i12) ev(ev(E35c));
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(%o12) 
$$\left[ \frac{d^2}{d\theta^2} \Psi = -n^2 \Psi \right]$$

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