In[14]:=
```
omega := 10.0;
m := 4.0;
epsilon := 0.5;
amp = 18.0
f[x_] := -amp * Sin[omega * x] - m * x
oldf[x_] := -4 * x
```

Out[17]= 18.

In[20]:=
```
v[x_] :=  Integrate[ -f[t]*(-t), {t, 0, x} ] + Integrate[ -f[t]*(-x), {t, x, 1} ];
Simplify[v[x]]
```

Out[21]= $0. - 3.51033\, x + 0.666667\, x^3 - 0.18 \operatorname{Sin}[10.\, x]$

In[22]:=
```
u[x_] := v[x] + epsilon * x + 1
```

In[23]:=
```
Simplify[u[x]]
```

Out[23]= $1. - 3.01033\, x + 0.666667\, x^3 - 0.18 \operatorname{Sin}[10.\, x]$

In[24]:=
```
Simplify[D[u[x], x]]
```

Out[24]= $-3.01033 + 2.\, x^2 - 1.8 \operatorname{Cos}[10.\, x]$

In[25]:=
```
v[0] // N
D[v[x], x] /. x → 1 // N
Simplify[D[D[v[x], x], x] + f[x]]
```

Out[25]= 0.

Out[26]= -8.88178×10^{-16}

Out[27]= $0. - 3.55271 \times 10^{-15} \operatorname{Sin}[10.\, x]$

In[28]:=
```
u[0]
D[u[x], x] /. x → 1
Simplify[D[D[u[x], x], x] + f[x]]
```

Out[28]= 1.

Out[29]= 0.5

Out[30]= $0. - 3.55271 \times 10^{-15} \operatorname{Sin}[10.\, x]$