Los valores de las constantes son:

In[63]:=
```
ρ = -0.01
S0 = 5
σ = 0.09
r = 0.08
t0 = 5
```

Out[63]= -0.01

Out[64]= 5

Out[65]= 0.09

Out[66]= 0.08

Out[67]= 5

Como podemos observar coinside con el u0 de ADM.

In[68]:=
```
u0[x_, t_] :=
 19.05 + 12.11 * x + 6.09 * x * x + 8.07 x * x * x + .24 x * x * x * x + .21 * x * x * x * x * x
```

In[69]:= `u0[x, t]`

Out[69]= $19.05 + 12.11\,x + 6.09\,x^2 + 8.07\,x^3 + 0.24\,x^4 + 0.21\,x^5$

In[70]:= $19.05` + 12.11`\,S0 + 6.09 * S0^2 + 8.07 * S0^3 + 0.24 * S0^4 + 0.21 * S0^5$

Out[70]= 2046.85

In[71]:= `A0[S, t] := (D[D[u0[S, t], S], S])^2`

In[72]:= `A0[S, t]`

Out[72]= $\left(12.18 + 48.42\,S + 2.88\,S^2 + 4.2\,S^3\right)^2$

In[73]:= $\left(12.18 + 48.42 * S0 + 2.88 * S0^2 + 4.2 * S0^3\right)^2$

Out[73]= 724 678.

In[74]:=
```
u1[S_, t_] :=
 -Integrate[-1 / 2 * σ^2 * S^2 * D[D[u0[S, t], S], S] + r * S * D[u0[S, t], S] - r, t] -
  ρ * σ^2 * (Integrate[-S^3 * A0[S, t], t])
```

In[75]:= `u1[S, t]`

Out[75]=
$$-0.000081\,S^3\left(12.18 + 48.42\,S + 2.88\,S^2 + 4.2\,S^3\right)^2 t - \left(-0.08 - 0.00405\,S^2\left(12.18 + 48.42\,S + 2.88\,S^2 + 4.2\,S^3\right) + 0.08\,S\left(12.11 + 12.18\,S + 24.21\,S^2 + 0.96\,S^3 + 1.05\,S^4\right)\right) t$$

In[76]:=
```
-0.000081 * S0^3 (12.18 + 48.42 * S0 + 2.88 * S0^2 + 4.2 * S0^3)^2 * t0 -
  (-0.08` - 0.00405 * S0^2 * (12.18` + 48.42 * S0 + 2.88 * S0^2 + 4.2 * S0^3) +
     0.08 * S0 * (12.11` + 12.18 * S0 + 24.21 * S0^2 + 0.96 * S0^3 + 1.05 * S0^4)) * t0
```

Out[76]= -39164.5

In[77]:=
```
A1[S, t] := 2 * (D[D[u0[S, t], S], S]) * (D[D[u1[S, t], S], S])
```

In[78]:=
```
A1[S, t]
```

Out[78]= $2\left(12.18+48.42\,S+2.88\,S^{2}+4.2\,S^{3}\right)\left(-0.000162\,S^{3}\left(48.42+5.76\,S+12.6\,S^{2}\right)^{2}t-0.000162\,S^{3}\,(5.76+25.2\,S)\left(12.18+48.42\,S+2.88\,S^{2}+4.2\,S^{3}\right)t-0.000972\,S^{2}\left(48.42+5.76\,S+12.6\,S^{2}\right)\left(12.18+48.42\,S+2.88\,S^{2}+4.2\,S^{3}\right)t-0.000486\,S\left(12.18+48.42\,S+2.88\,S^{2}+4.2\,S^{3}\right)^{2}t-\left(-0.00405\,S^{2}\,(5.76+25.2\,S)+0.0638\,S\left(48.42+5.76\,S+12.6\,S^{2}\right)+0.1519\left(12.18+48.42\,S+2.88\,S^{2}+4.2\,S^{3}\right)\right)t\right)$

In[79]:=
```
a1[S_, t_] := 2 (12.18` + 48.42` S + 2.88` S^2 + 4.2` S^3)
  (-0.000162` S^3 (48.42` + 5.76` S + 12.600000000000001` S^2)^2 t - 0.000162` S^3
     (5.76` + 25.200000000000003` S) (12.18` + 48.42` S + 2.88` S^2 + 4.2` S^3) t - 0.000972`
     S^2 (48.42` + 5.76` S + 12.600000000000001` S^2) (12.18` + 48.42` S + 2.88` S^2 + 4.2` S^3)
     t - 0.000486` S (12.18` + 48.42` S + 2.88` S^2 + 4.2` S^3)^2 t -
    (-0.00405` S^2 (5.76` + 25.200000000000003` S) +
       0.06380000000000001` S (48.42` + 5.76` S + 12.600000000000001` S^2) +
       0.1519` (12.18` + 48.42` S + 2.88` S^2 + 4.2` S^3)) t)
```

In[80]:=
```
a1[5, 5]
```

Out[80]= -1.31966×10^{8}

```
u2[S_, t_] :=
 -Integrate[-1 / 2 * σ^2 * S^2 * D[D[u1[S, t], S], S] + r * S * D[u1[S, t], S] - r, t] -
  ρ * σ^2 * (Integrate[-S^3 * A1[S, t], t])
```

```
u2[S, t]
```

$0.08\,t+0.168177\,t^{2}+0.756911\sqrt{S}\,t^{2}+0.0032\,S\,t^{2}$

```
A2[S, t] := 2 * (D[D[u0[S, t], S], S]) * (D[D[u2[S, t], S], S]) + (D[D[u1[S, t], S], S])^2
```

```
A2[S, t]
```

$\frac{170.305\,t^{2}}{S^{3}}$

```
u3[S_, t_] :=
 -Integrate[-1 / 2 * σ^2 * S^2 * D[D[u2[S, t], S], S] + r * S * D[u2[S, t], S] - r, t] -
  ρ * σ^2 * (Integrate[-S^3 * A2[S, t], t])
```

```
u3[S, t]
```

$$0.08\,t - 0.00459824\,t^3 - 0.0103476\,\sqrt{S}\,t^3 - 0.0000853333\,S\,t^3$$

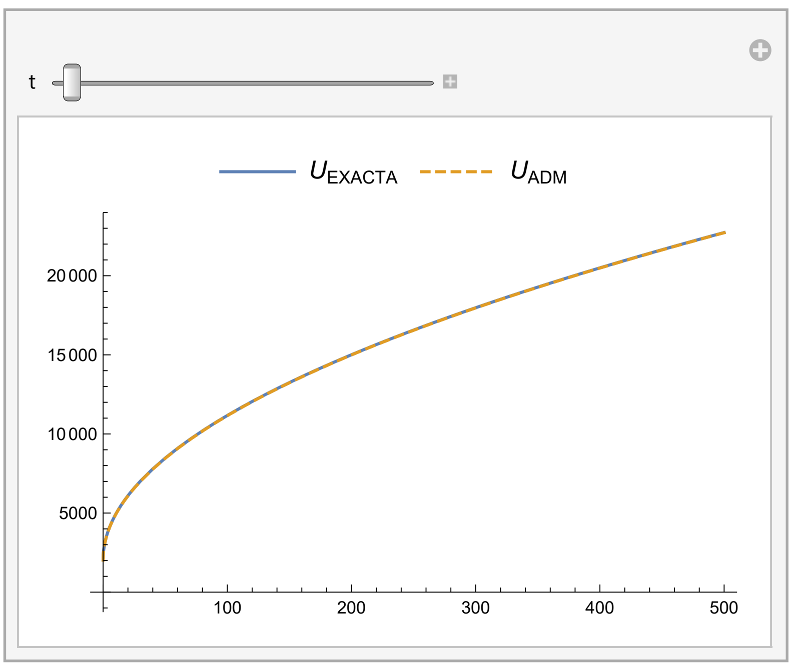
```
u[S_, t_] := u0[S, t] + u1[S, t] + u2[S, t] + u3[S, t]
u[S, t]
```

$$2025 + 900\sqrt{S} + S - 3.94063\,t - \left(-0.08 + 0.91125\sqrt{S} + 0.08\left(1 + \frac{450}{\sqrt{S}}\right) S\right) t + 0.168177\,t^2 + 0.756911\sqrt{S}\,t^2 + 0.0032\,S\,t^2 - 0.00459824\,t^3 - 0.0103476\sqrt{S}\,t^3 - 0.0000853333\,S\,t^3$$

```
uA[S_, t_] := u[S, t]
```

$$\text{Manipulate}\Big[\text{Plot}\Big[\Big\{900.\text{`}\left(\frac{9\,e^{0.082025\text{`}*t}}{4} + e^{0.0410125\text{`}*t}\sqrt{S}\right) + S,\ 2025 + 900\sqrt{S} + S - \left(-3.940625\text{`}\,t - \left(-0.08\text{`} + 0.91125\text{`}\sqrt{S} + 0.08\text{`}\left(1 + \frac{450}{\sqrt{S}}\right) S\right) t + 0.1681768828125\text{`}\,t^2 + 0.7569113203125\text{`}\sqrt{S}\,t^2 + 0.0032\text{`}\,S\,t^2 - 0.00459823627089843 9\text{`}\,t^3 - 0.010347608508105469\text{`}\sqrt{S}\,t^3 - 0.00008533333333333334\text{`}\,S\,t^3\right)\Big\},$$

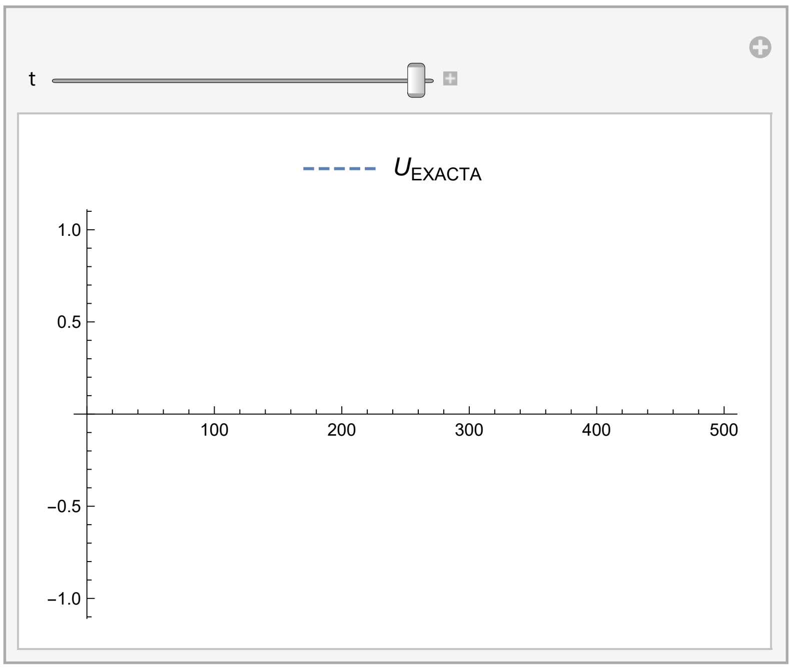
```
  {S, 0, 500}, PlotLegends → Placed[{"U_EXACTA", "U_ADM"}, Above],
  PlotStyle → {Triangle, Dashed},
  AxesOrigin → {0, 0}], {t, 0, 10}]
```

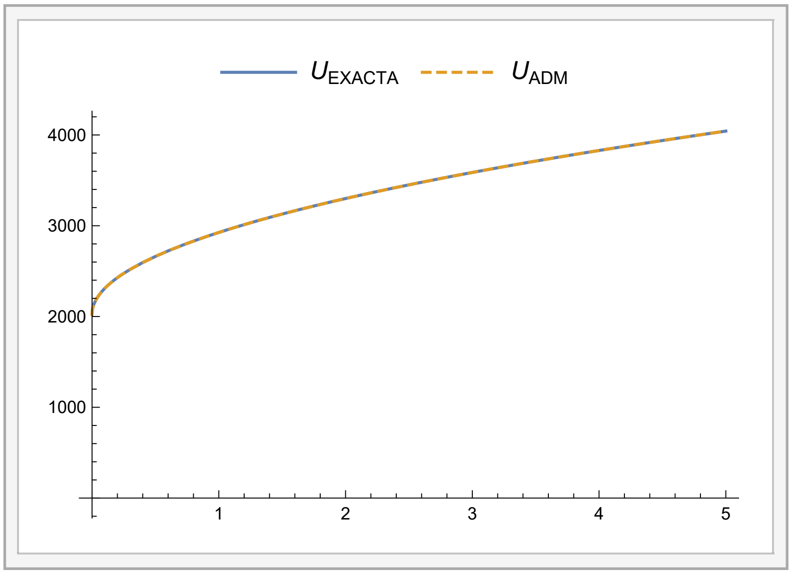


```
uA[S, t]
```

$$2025 + 900\sqrt{S} + S - 3.94063\,t - \left(-0.08 + 0.91125\sqrt{S} + 0.08\left(1 + \frac{450}{\sqrt{S}}\right)S\right)t + 0.168177\,t^2 + 0.756911\sqrt{S}\,t^2 + 0.0032\,S\,t^2 - 0.00459824\,t^3 - 0.0103476\sqrt{S}\,t^3 - 0.0000853333\,S\,t^3$$

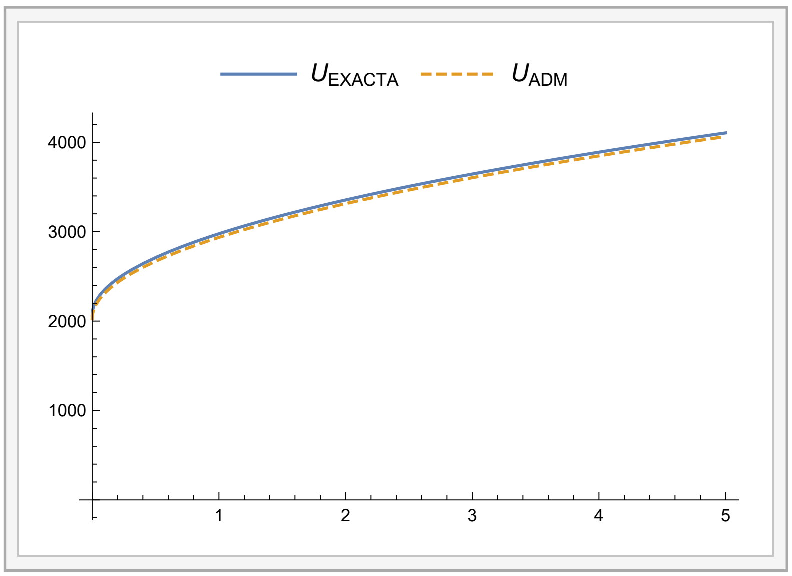
```
Manipulate[
 Plot[{U[S, t]}, {S, 0, 500}, PlotLegends → Placed[{"U_EXACTA", "U_ADM"}, Above],
  PlotStyle → {Triangle, Dashed}, AxesOrigin → {0, 0}], {t, 0.1, 10}]
```





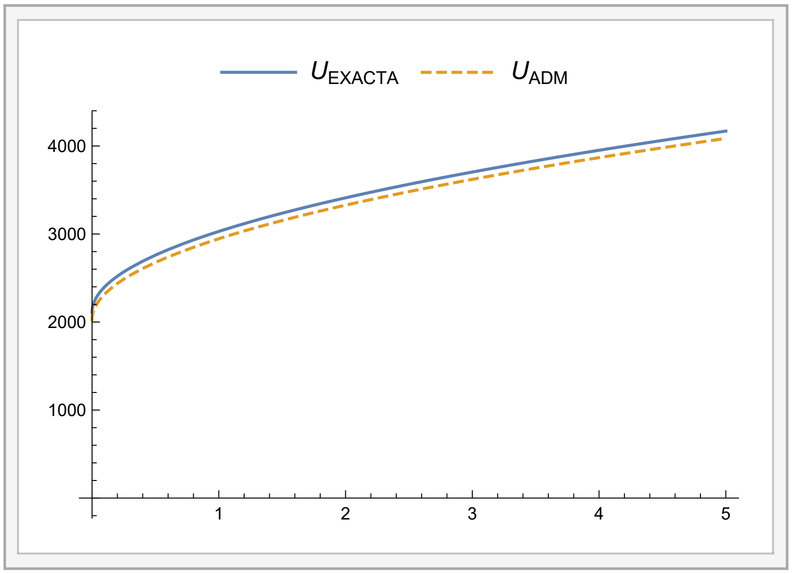
U_{EXACTA}
U_{ADM}
4000
3000
2000
1000
1
2
3
4
5

0



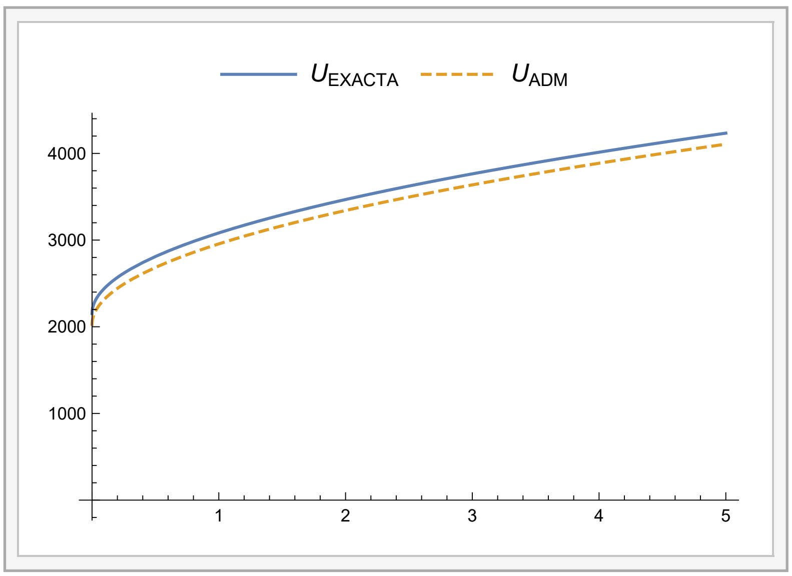
U_{EXACTA}
U_{ADM}
4000
3000
2000
1000
1
2
3
4
5

.25



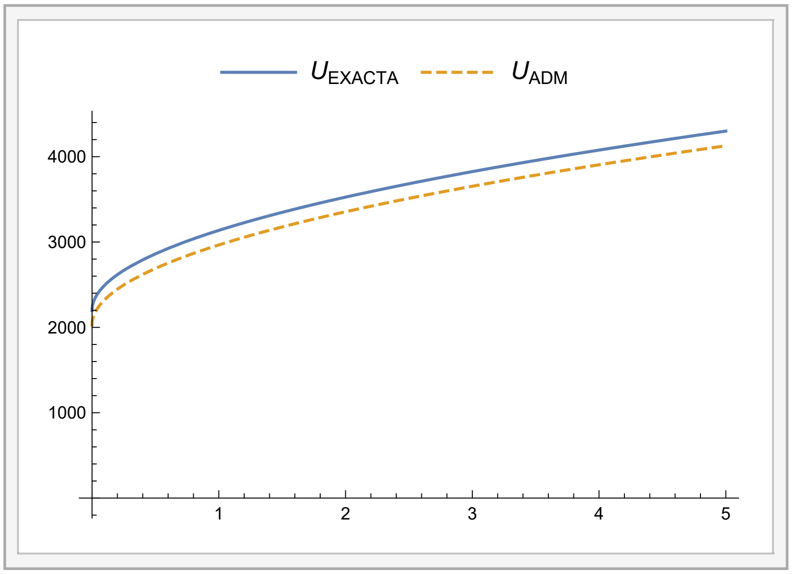
U_{EXACTA}
U_{ADM}
4000
3000
2000
1000
1
2
3
4
5

5



U_{EXACTA}
U_{ADM}
4000
3000
2000
1000
1
2
3
4
5

75



1

```
f[x_] := 19.05 + 12.11 * x + 6.09 * x ^2 + 8.07 * x^3 + .24 * x^4 +
   .21 * x^5 + .084 * x^6 + .85 * x^7 + .75 * x^8 + .24 * x^9 + .57 * x^10
```

```
f'[5]
```

1.25413×10^{7}

```
f''[5]
```

2.21593×10^{7}

```
f'''[5]
```

3.48532×10^{7}

```
f''''[5]
```

4.80331×10^{7}

```
f''''[5]
```

4.80331×10^{7}

```
Integrate[f[x], {x, 0, 5}]
```

2.97222×10^{6}

```
f[x_] := 19.05 + 12.11 * x + 6.09 x^2 + 8.07 * x^3 + .24 * x^4
```

```
f'[5]
```

798.26

```
f''[5]
```

326.28

```
f'''[5]
```

77.22

```
f''''[5]
```

5.76

```
Integrate[f[x], {x, 0, 5}]
```

1911.31