Los valores de las constantes son:

```
ρ = -0.01
S0 = 81
σ = 0.09
r = 0.08
```

-0.01

81

0.09

0.08

La solución exacta es :

$$U[S\_, t\_] := S - \frac{\sqrt{S0}}{\rho} \left(\sqrt{S}\ \mathrm{Exp}\left[\frac{r + \frac{\sigma\verb|^|2}{4}}{2} * t \right] + \frac{\sqrt{S0}}{4}\ \mathrm{Exp}\left[\left(r + \frac{\sigma\verb|^|2}{4} \right) * t \right] \right)$$

U[S, t]

$$900. \left(\frac{9\, e^{0.082025\, t}}{4} + e^{0.0410125\, t} \sqrt{S} \right) + S$$

900 * 2.44234

2198.11

Observamos para el caso donde t=0

U[S, 0]

$$900. \left(2.25 + 1. \sqrt{S} \right) + S$$

Como podemos observar coinside con el u0 de ADM.

```
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
```

u0[x, t]

$$19.05 + 12.11\, x + 6.09\, x^2 + 8.07\, x^3 + 0.24\, x^4 + 0.21\, x^5$$

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

A0[S, t]

$$\left(12.18 + 48.42\, S + 2.88\, S^2 + 4.2\, S^3 \right)^2$$

```
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])
```

```
u1[S, t]
```

$$-4.10063\, t - \left(-0.08 + 0.91125 \sqrt{S} + 0.08 \left(1 + \frac{450}{\sqrt{S}}\right) S\right) t$$

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

```
A1[S, t]
```

$$-\frac{4152.52\, t}{S^3}$$

```
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]
```

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

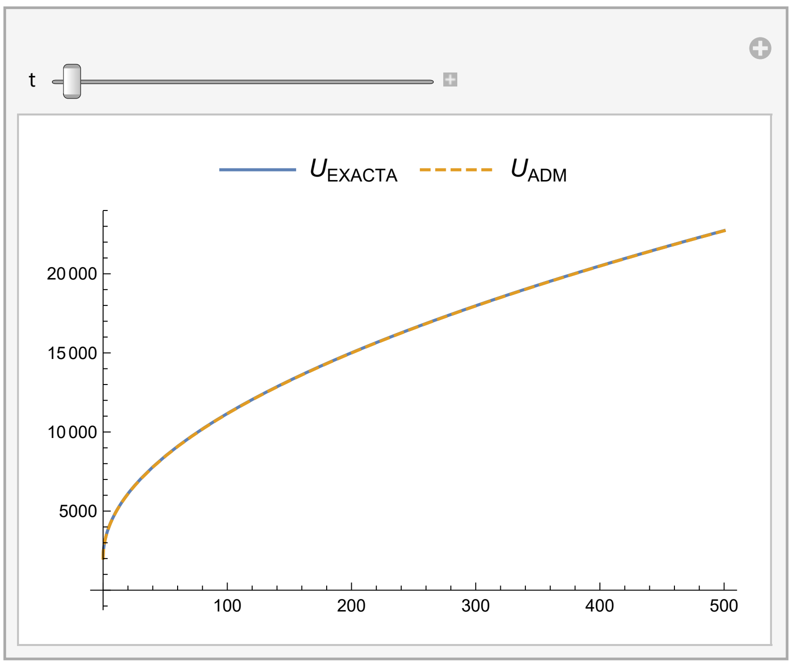
```
u[S_, t_] := u0[S, t] + u1[S, t] + u2[S, t] + u3[S, t]
```

```
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]
```

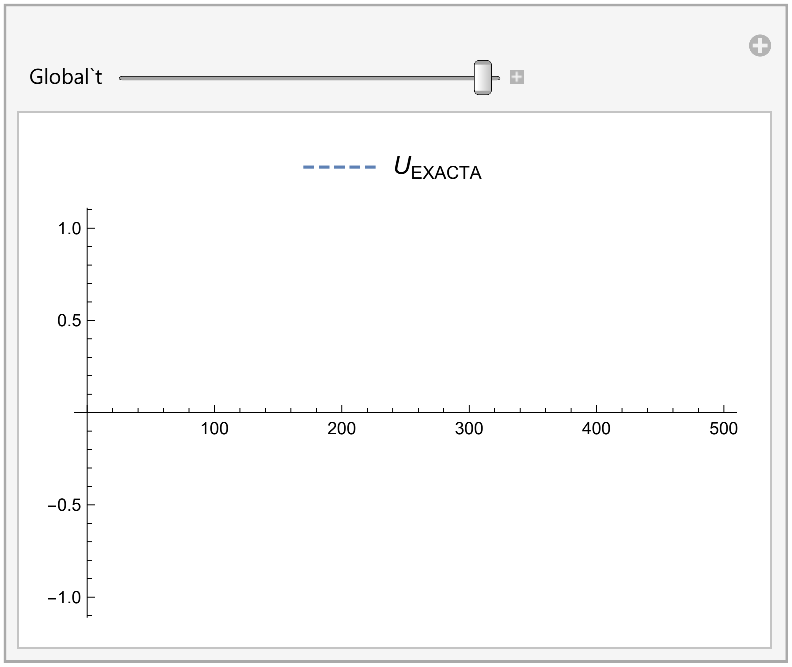
```
Manipulate[Plot[{900.` (9 ⅇ^(0.082025`*t)/4 + ⅇ^(0.0410125`*t) √S) + S, 2025 + 900 √S + S -
    (-3.940625` t - (-0.08` + 0.91125` √S + 0.08` (1 + 450/√S) S) t + 0.1681768828125` t^2 +
      0.7569113203125` √S t^2 + 0.0032` S t^2 - 0.004598236270898439` t^3 -
      0.010347608508105469` √S t^3 - 0.00008533333333333334` S t^3)},
  {S, 0, 500}, PlotLegends → Placed[{"U_EXACTA", "U_ADM"}, Above],
  PlotStyle → {Triangle, Dashed},
  AxesOrigin → {0, 0}], {t, 0, 10}]
```

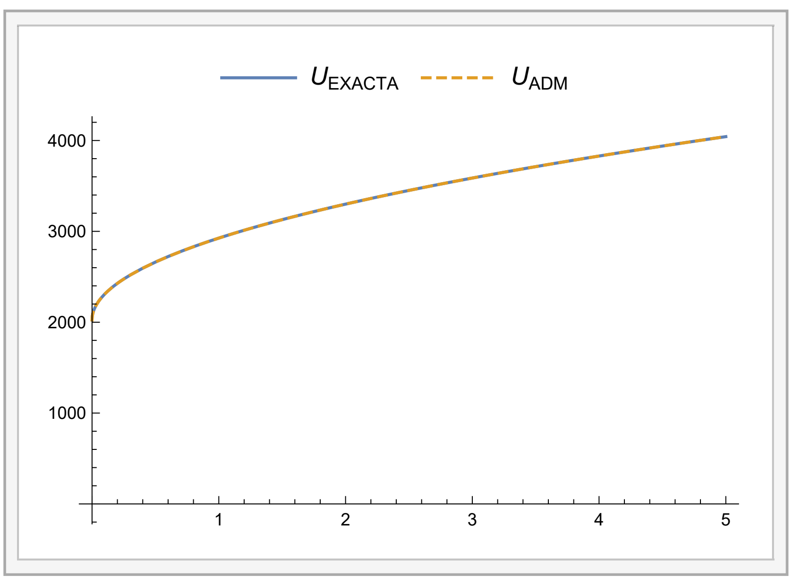


uA[S, t]

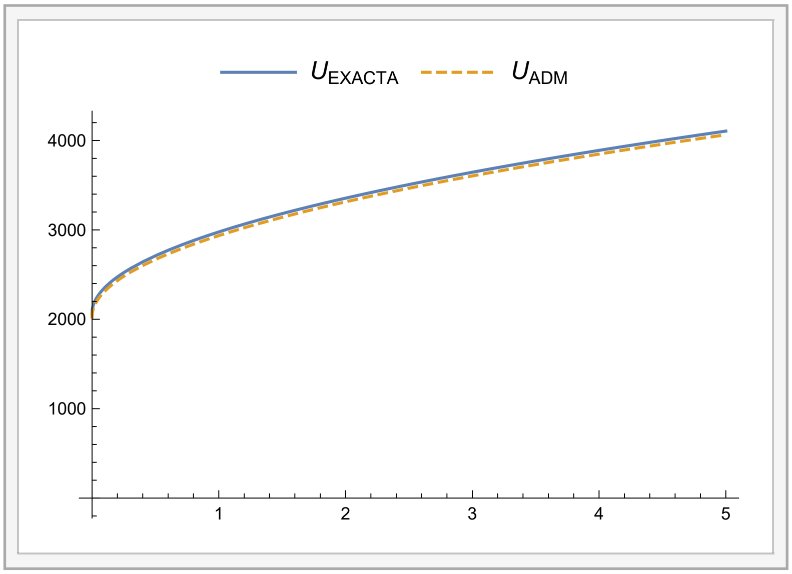
$$2025 + 900\sqrt{S} + S - 3.94063\,t - \left(-0.08 + 0.91125\sqrt{S} + 0.08\left(1 + \frac{450}{\sqrt{S}}\right) S\right) t + 0.168177\,t^2 + 0.756911\sqrt{S}\,t^2 + 0.0032\,S\,t^2 - 0.00459824\,t^3 - 0.0103476\sqrt{S}\,t^3 - 0.0000853333\,S\,t^3$$

```
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}]
```

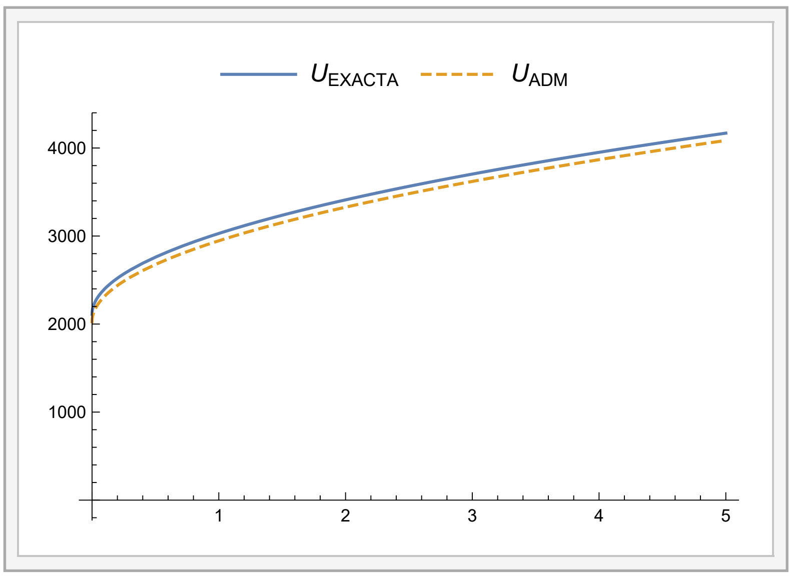




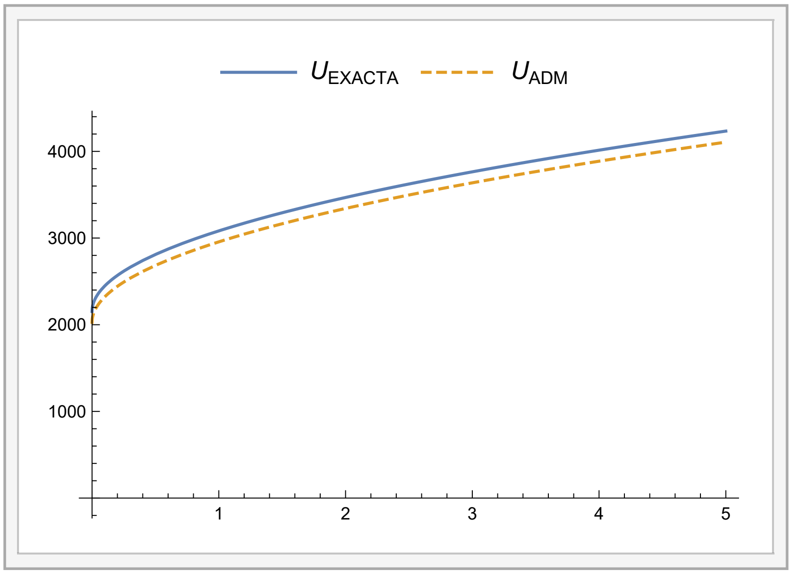
0


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

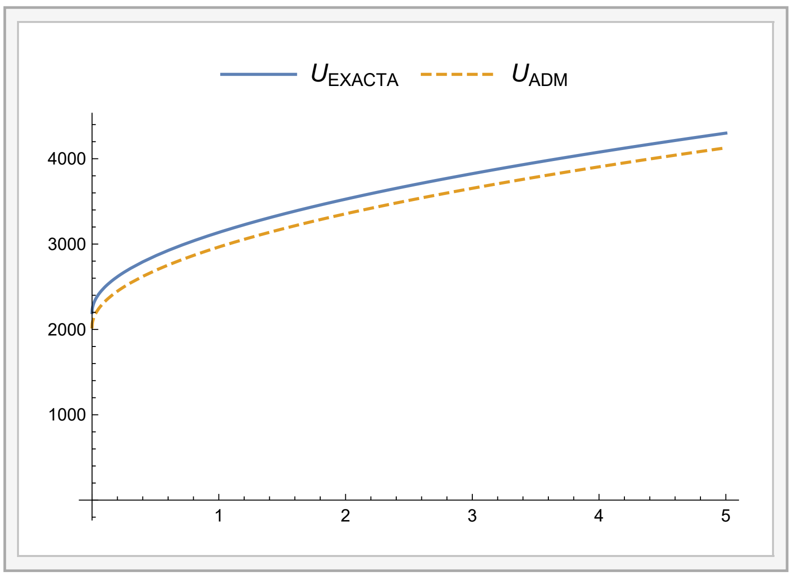
.25


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

5



75



1

```
In[12]:= f[x_] := 19.05 + 12.11 * x + 6.09 ^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

In[13]:= f'[5]

Out[13]= 1.25412 × 10^7

In[14]:= f''[5]

Out[14]= 2.21593 × 10^7

In[15]:= f'''[5]

Out[15]= 3.48532 × 10^7

In[16]:= f''''[5]

Out[16]= 4.80331 × 10^7
```

In[17]:=
```
f''''[5]
```

Out[17]= 4.80331×10^{7}

In[18]:=
```
Integrate[f[x], {x, 0, 5}]
```

Out[18]= 2.97215×10^{6}