In[10]:=
```
(*I*)
DSolve[{y'''[x] - ((3 / x) * (y''[x])) == (b * Log[x]), y''[2] == 3, y'[2] == 1 / 2, y[2] == 2}, y[x], x]
```

Out[10]=

$$\left\{\left\{y[x] \to \frac{1}{2880}\left(9792 + 512\,b - 2880\,x - 720\,b\,x + 80\,b\,x^3 + 54\,x^5 + 9\,b\,x^5 - 1536\,b\,\text{Log}[2] + 1440\,b\,x\,\text{Log}[2] + 18\,b\,x^5\,\text{Log}[2] - 240\,b\,x^3\,\text{Log}[x]\right)\right\}\right\}$$

In[15]:=
```
(*II*)
DSolve[y'''[t] - y''[t] == (b * (Exp[3 * t] * Log[t])), y[t], t];
```

In[3]:=
```
DSolve[
 {y'''[t] - y''[t] == (b * (Exp[3 * t] * Log[t])), y''[2] == 3, y'[2] == 1 / 2, y[2] == 2}, y[t], t]
```

Out[3]=

$$\left\{\left\{y[t] \to \frac{1}{18\,e^2}\left(72\,e^2 + 2\,b\,e^8 + 54\,e^t - 2\,b\,e^{2+3\,t} - 45\,e^2\,t + 9\,b\,e^{2+t}\,\text{ExpIntegralEi}[4] - 8\,b\,e^2\,\text{ExpIntegralEi}[6] - 6\,b\,e^2\,t\,\text{ExpIntegralEi}[6] - 9\,b\,e^{2+t}\,\text{ExpIntegralEi}[2\,t] + 8\,b\,e^2\,\text{ExpIntegralEi}[3\,t] + 6\,b\,e^2\,t\,\text{ExpIntegralEi}[3\,t] - 4\,b\,e^8\,\text{Log}[2] - 9\,b\,e^{6+t}\,\text{Log}[2] + 6\,b\,e^8\,t\,\text{Log}[2] + b\,e^{2+3\,t}\,\text{Log}[t]\right)\right\}\right\}$$

In[4]:=
```
(*III*)
A = Simplify[DSolve[
  {y'''[x] - ((3 / x) * (y''[x])) == (b * Log[x]), y''[2] == 3, y'[2] == 1 / 2, y[2] == 2}, y[x], x]]
```

Out[4]=

$$\left\{\left\{y[x] \to \frac{1}{2880}\left(18\left(544 - 160\,x + 3\,x^5\right) + b\left(80\,x^3 + 720\,x\,(-1 + \text{Log}[4]) + 9\,x^5\,(1 + \text{Log}[4]) - 512\,(-1 + \text{Log}[8])\right) - 240\,b\,x^3\,\text{Log}[x]\right)\right\}\right\}$$

In[6]:=
```
B = Simplify[DSolve[
  {y'''[t] - y''[t] == ((b * Exp[3 * t] * Log[t])), y''[2] == 3, y'[2] == 1 / 2, y[2] == 2}, y[t], t]]
```

Out[6]=

$$\left\{\left\{y[t] \to \frac{1}{18}\left(72 + 2\,b\,e^6 + 54\,e^{-2+t} - 2\,b\,e^{3\,t} - 45\,t + 9\,b\,e^t\,\text{ExpIntegralEi}[4] - 8\,b\,\text{ExpIntegralEi}[6] - 6\,b\,t\,\text{ExpIntegralEi}[6] - 9\,b\,e^t\,\text{ExpIntegralEi}[2\,t] + 2\,b\,(4 + 3\,t)\,\text{ExpIntegralEi}[3\,t] - 4\,b\,e^6\,\text{Log}[2] - 9\,b\,e^{4+t}\,\text{Log}[2] + b\,e^6\,t\,\text{Log}[64] + b\,e^{3\,t}\,\text{Log}[t]\right)\right\}\right\}$$

In[8]:=
```
Simplify[A - B]
```

Out[8]=
$$\left\{\left\{-\left(y[t] \to \frac{1}{18}\left(72 + 2\,b\,e^{6} + 54\,e^{-2+t} - 2\,b\,e^{3\,t} - 45\,t + 9\,b\,e^{t}\,\text{ExpIntegralEi}[4] - 8\,b\,\text{ExpIntegralEi}[6] - 6\,b\,t\,\text{ExpIntegralEi}[6] - 9\,b\,e^{t}\,\text{ExpIntegralEi}[2\,t] + 2\,b\,(4 + 3\,t)\,\text{ExpIntegralEi}[3\,t] - 4\,b\,e^{6}\,\text{Log}[2] - 9\,b\,e^{4+t}\,\text{Log}[2] + b\,e^{6}\,t\,\text{Log}[64] + b\,e^{3\,t}\,\text{Log}[t]\right)\right) + \left(y[x] \to \frac{1}{2880}\left(18\left(544 - 160\,x + 3\,x^{5}\right) + b\left(80\,x^{3} + 720\,x\,(-1 + \text{Log}[4]) + 9\,x^{5}\,(1 + \text{Log}[4]) - 512\,(-1 + \text{Log}[8])\right) - 240\,b\,x^{3}\,\text{Log}[x]\right)\right)\right\}\right\}$$

(*IV*)

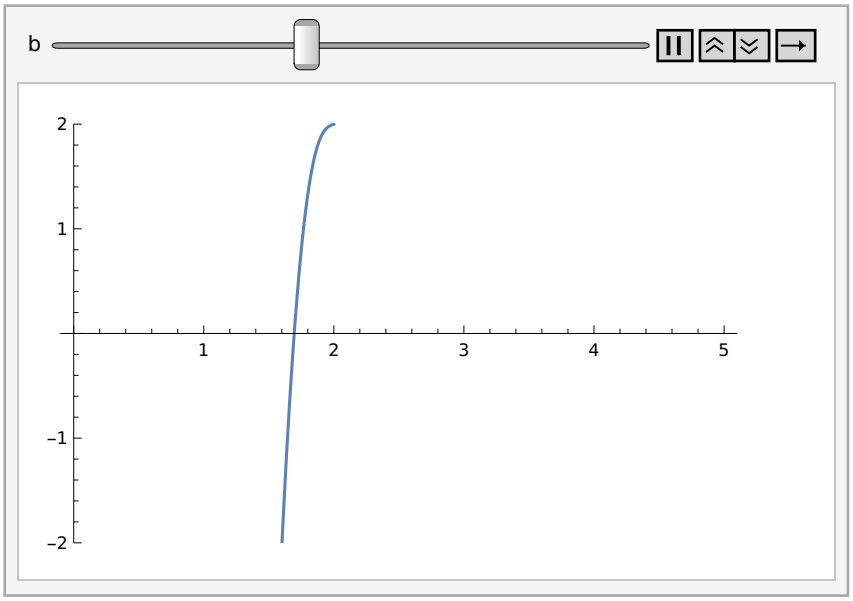
In[6]:=
```
Manipulate[DSolve[{y'''[t] - y''[t] == ((b * Exp[3 * t] * Log[t])),
    y''[2] == 3, y'[2] == 1/2, y[2] == 2}, y[t], t], {b, 0.5, 5.5, 0.5}]
```

b

Out[6]=
$$\left\{\left\{y[t] \to -0.25\left(95.067 + 16.5897\,e^{1.\,t} + 0.222222\,e^{3.\,t} - 119.097\,t + 1.\,e^{1.\,t}\,\text{ExpIntegralEi}[2.\,t] - 0.888889\,\text{ExpIntegralEi}[3.\,t] - 0.666667\,t\,\text{ExpIntegralEi}[3.\,t] - 0.111111\,e^{3.\,t}\,\text{Log}[t]\right)\right\}\right\}$$

In[9]:=
```
Animate[
 Plot[{{1/18 (72 + 2 b E^6 + 54 E^(-2+t) - 2 b E^(3 t) - 45 t + 9 b E^t ExpIntegralEi[4] - 8 b ExpIntegralEi[6] -
      6 b t ExpIntegralEi[6] - 9 b E^t ExpIntegralEi[2 t] +
      2 b (4 + 3 t) ExpIntegralEi[3 t] - 4 b E^6 Log[2] - 9 b E^(4+t) Log[2] +
      b E^6 t Log[64] + b E^(3 t) Log[t])}}, {t, 0, 5}, PlotRange -> 2], {b, 0, 5}]
```

Out[9]=



(*V*)

In[12]:=
```
{{y[t] -> 1/(18 E^2)
  (72 E^2 + 2 b E^8 + 54 E^t - 2 b E^(2+3 t) - 45 E^2 t + 9 b E^(2+t) ExpIntegralEi[4] - 8 b E^2 ExpIntegralEi[6] -
    6 b E^2 t ExpIntegralEi[6] - 9 b E^(2+t) ExpIntegralEi[2 t] + 8 b E^2 ExpIntegralEi[3 t] +
    6 b E^2 t ExpIntegralEi[3 t] - 4 b E^8 Log[2] - 9 b E^(6+t) Log[2] + 6 b E^8 t Log[2] + b E^(2+3 t) Log[t])}}
```

Out[12]=

$$\left\{\left\{y[t] \to \frac{1}{18\, e^2}\left(72\, e^2 + 2\, b\, e^8 + 54\, e^t - 2\, b\, e^{2+3t} - 45\, e^2\, t + 9\, b\, e^{2+t}\, \text{ExpIntegralEi}[4] - 8\, b\, e^2\, \text{ExpIntegralEi}[6] - 6\, b\, e^2\, t\, \text{ExpIntegralEi}[6] - 9\, b\, e^{2+t}\, \text{ExpIntegralEi}[2\, t] + 8\, b\, e^2\, \text{ExpIntegralEi}[3\, t] + 6\, b\, e^2\, t\, \text{ExpIntegralEi}[3\, t] - 4\, b\, e^8\, \text{Log}[2] - 9\, b\, e^{6+t}\, \text{Log}[2] + 6\, b\, e^8\, t\, \text{Log}[2] + b\, e^{2+3t}\, \text{Log}[t]\right)\right\}\right\}$$

In[13]:=
```
f[t_] := {{1/(18 e^2)
  (72 e^2 + 2 b e^8 + 54 e^t - 2 b e^(2+3 t) - 45 e^2 t + 9 b e^(2+t) ExpIntegralEi[4] - 8 b e^2 ExpIntegralEi[6] -
    6 b e^2 t ExpIntegralEi[6] - 9 b e^(2+t) ExpIntegralEi[2 t] + 8 b e^2 ExpIntegralEi[3 t] +
    6 b e^2 t ExpIntegralEi[3 t] - 4 b e^8 Log[2] - 9 b e^(6+t) Log[2] + 6 b e^8 t Log[2] + b e^(2+3 t) Log[t])}}
```

In[19]:=
```
yp[t_] := b * (Exp[3 * t] * Log[t])

m[t_] := Integrate[yp[t], t]
m[t]
```

Out[24]=

$$b\left(-\frac{1}{3}\,\text{ExpIntegralEi}[3\,t]+\frac{1}{3}\,e^{3\,t}\,\text{Log}[t]\right)$$

```
(*Por lo que la función m[x] no es constante,
y no es posible integrar sin recurrir a ortos métodos, tal vez.*)
```