Naloga 2:

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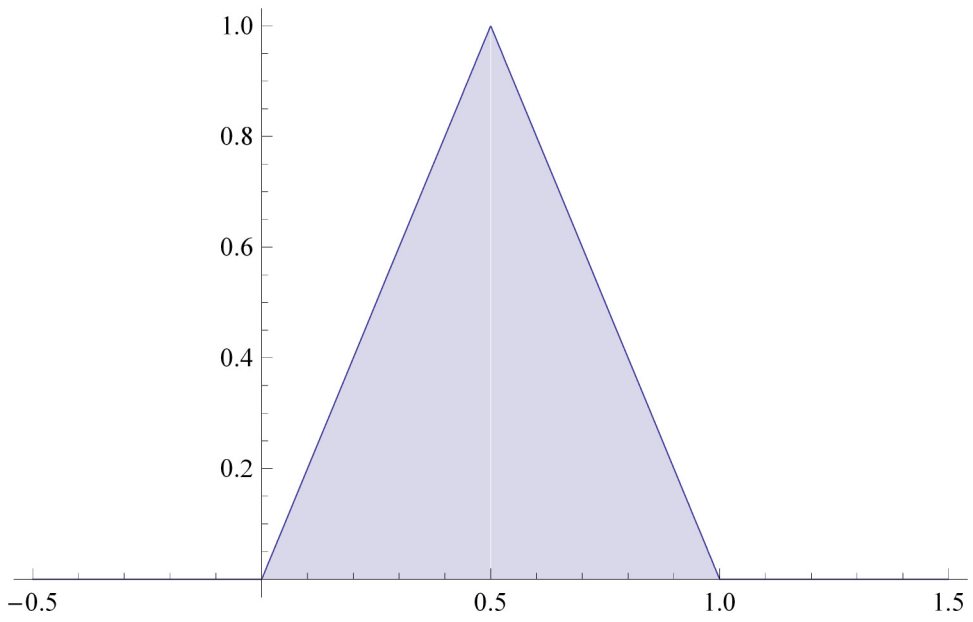
Izračunaj izhod LSS sistema s prevajalno funkcijo h(t) in vhodnim signalom u(t):

Prevajalna funkcija LSS:

In[31]:=
```
Plot[h[t], {t, -0.5, 1.5}, PlotRange → All, Filling → Axis]
```

Out[31]=

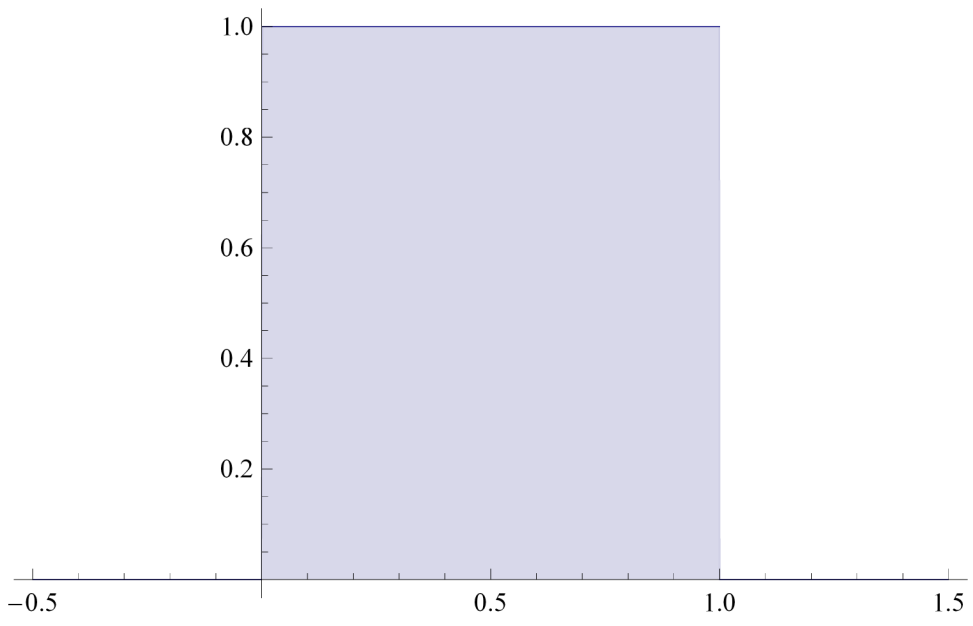


In[30]:=
```
h[t_] := Piecewise[{{2 t, 0 ≤ t ≤ 1 / 2}, {-2 t + 2, 1 / 2 ≤ t ≤ 1}, {0, True}}]
```

Vhodni signal:

In[34]:=
```
Plot[u[t], {t, -0.5, 1.5}, PlotRange → All, Filling → Axis]
```

Out[34]=



In[32]:=
```
u[t_] := Piecewise[{{1, 0 ≤ t ≤ 1}, {0, True}}]
```

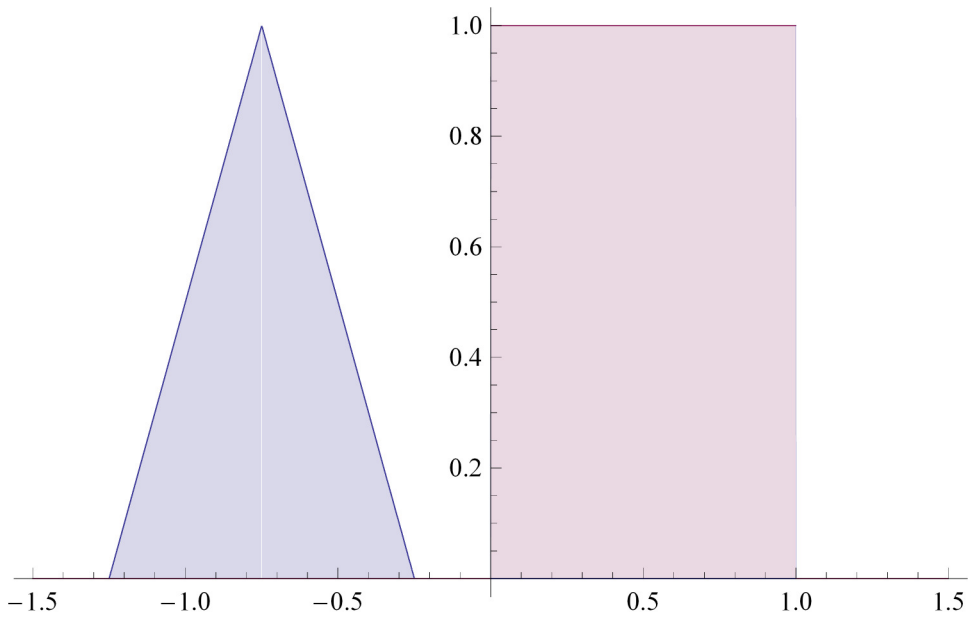
Konvolucija:

$$y(t) = \int_{-\infty}^{\infty} u(\tau)\, h(t-\tau)\, d\tau$$

Za interval t < 0:

In[36]:=
```
t = -1/4; Plot[{h[t - τ], u[τ]}, {τ, -1.5, 1.5}, PlotRange → All, Filling → Axis]
```

Out[36]=

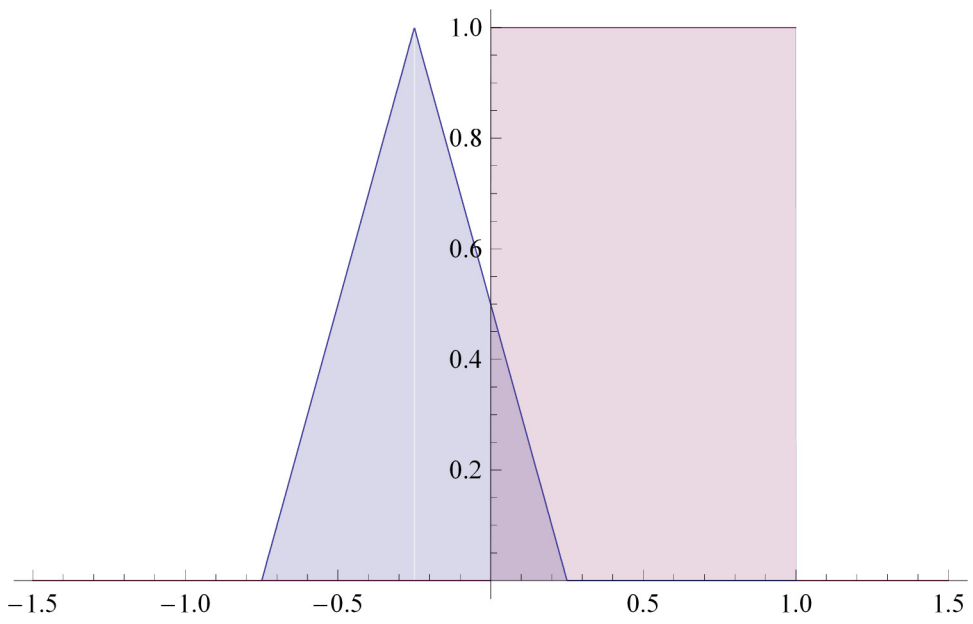



```
y = 0;
```

Za interval $0 \le t \le \frac{1}{2}$:

In[37]:=
```
t = 1/4; Plot[{h[t - τ], u[τ]}, {τ, -1.5, 1.5}, PlotRange → All, Filling → Axis]
```

Out[37]=



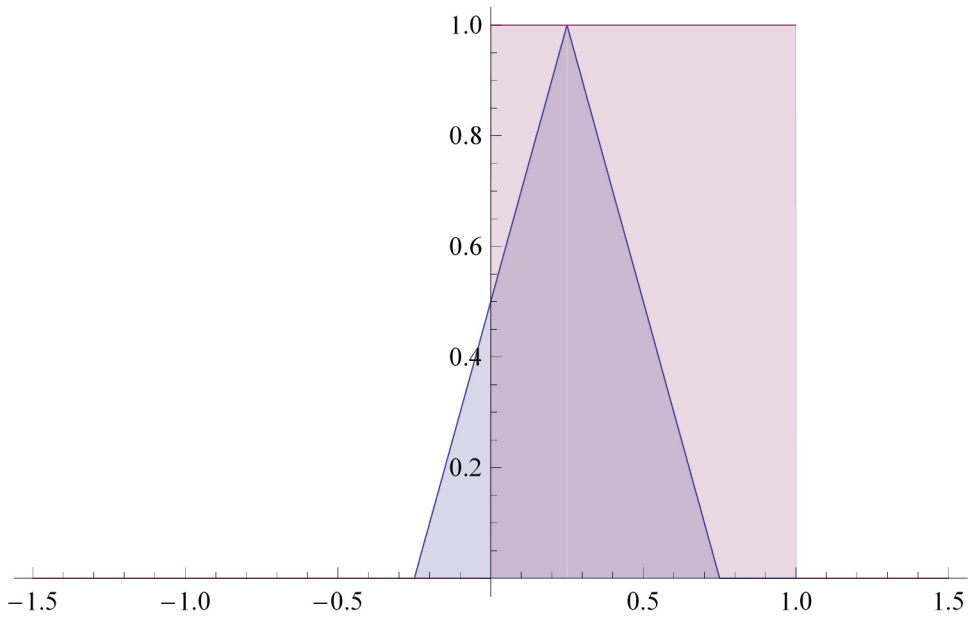
In[38]:=
```
y = ∫_0^t 1 * (2 * (t - τ)) dτ
```

Out[38]=
$$t^2$$

Za interval $\frac{1}{2} \leq t \leq 1$:

In[39]:=
```
t = 3/4; Plot[{h[t - τ], u[τ]}, {τ, -1.5, 1.5}, PlotRange → All, Filling → Axis]
```

Out[39]=



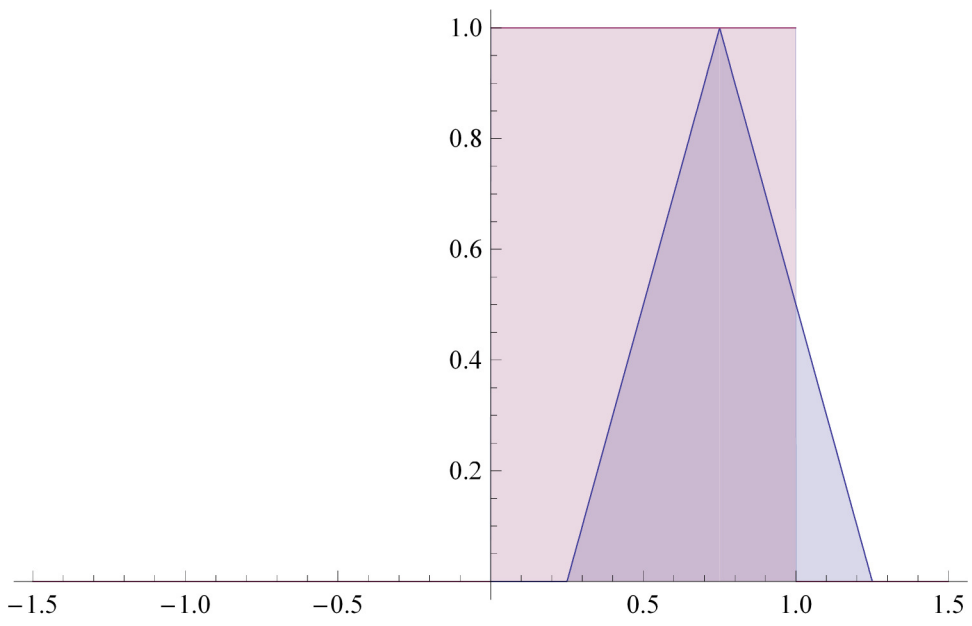
In[42]:=
```
y = ∫_0^(t-1/2) 1 * (-2 * (t - τ) + 2) dτ + 1/4
```

Out[42]=
$$-\frac{1}{2} + 2\,t - t^2$$

Za interval $1 \leq t \leq \frac{3}{2}$:

In[43]:=
```
t = 5/4; Plot[{h[t - τ], u[τ]}, {τ, -1.5, 1.5}, PlotRange → All, Filling → Axis]
```

Out[43]=



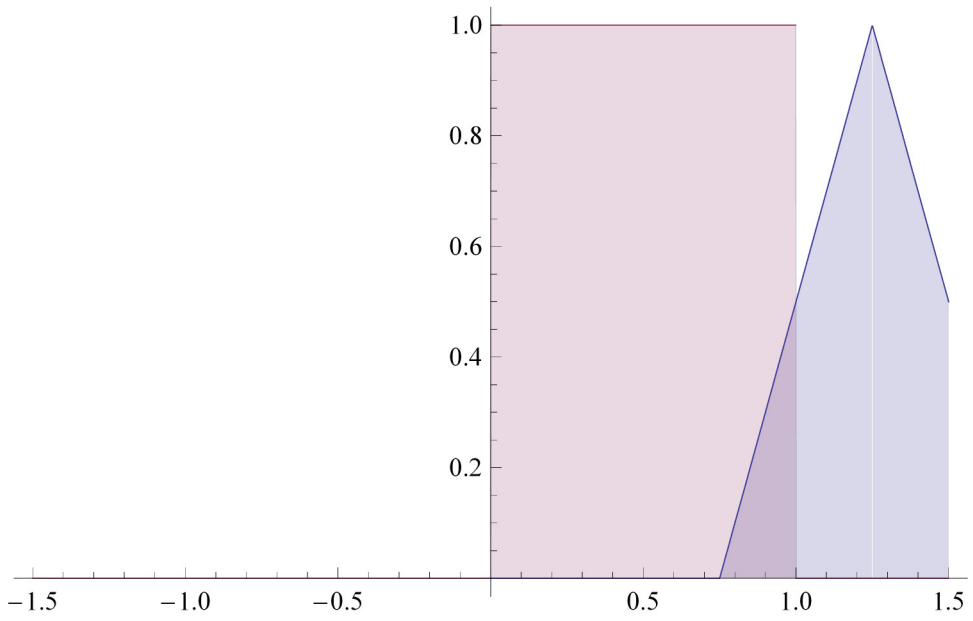
In[44]:=
```
y = 1/4 + ∫_(t-1/2)^1 1 * (2 * (t - τ)) dτ
```

Out[44]=
$$-\frac{1}{2} + 2\,t - t^2$$

Za interval $\frac{3}{2} \leq t \leq 2$:

In[45]:=
```
t = 7/4; Plot[{h[t - τ], u[τ]}, {τ, -1.5, 1.5}, PlotRange → All, Filling → Axis]
```

Out[45]=



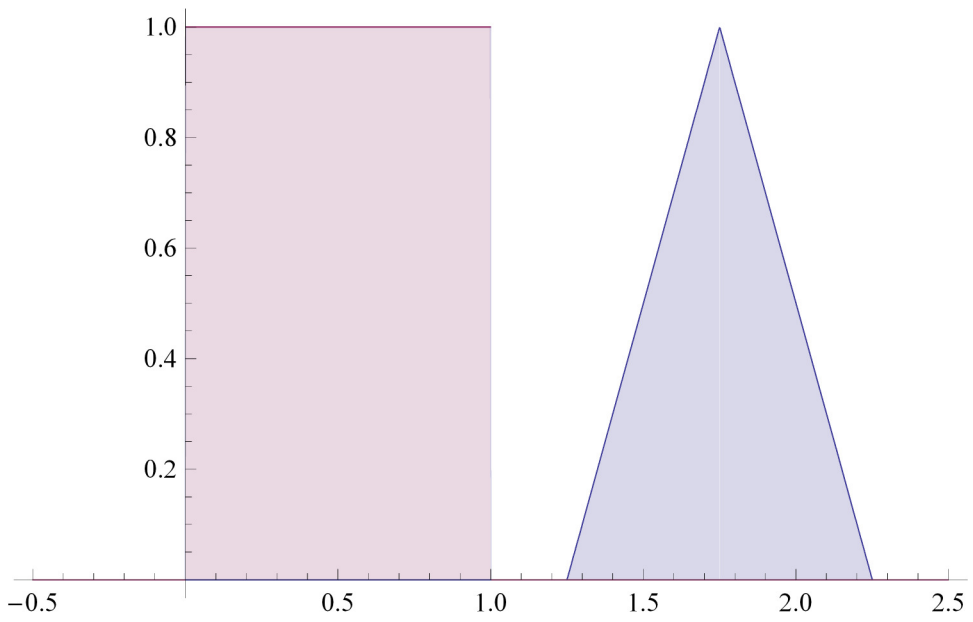
In[46]:=
```
y = ∫_(t-1)^1 1 * (-2 * (t - τ) + 2) dτ
```

Out[46]=
$$4 - 4\,t + t^2$$

Za interval $t \geq 2$:

In[48]:=
```
t = 9/4; Plot[{h[t - τ], u[τ]}, {τ, -0.5, 2.5}, PlotRange → All, Filling → Axis]
```

Out[48]=




```
y = 0
```

Skica izhodnega signala y(t)

```
                ⎧     t^2          0 ≤ t ≤ 1 / 2
                ⎪ -1/2 + 2 t - t^2 1 / 2 ≤ t ≤ 1
y[t_] := Piecewise⎨ -1/2 + 2 t - t^2 1 ≤ t ≤ 3 / 2
                ⎪ 4 - 4 t + t^2    3 / 2 ≤ t ≤ 2
                ⎩       0              True
```

In[53]:=
```
Plot[y[t], {t, -0.5, 2.5}, PlotRange → All, Filling → Axis]
```

Out[53]=