Chapter 1 Problem 2:

1.

Constrained expression

In[1]:=
```
y1[x_] := g[x] + (y0 - g[x0]) + (Sec[x0] Sin[x] - Tan[x0]) (yx0 - (D[g[x], x] /. x → x0));
y1[x] // TraditionalForm
```

Out[2]//TraditionalForm=

$$(\mathrm{yx0} - g'(\mathrm{x0}))\,(\sin(x)\sec(\mathrm{x0}) - \tan(\mathrm{x0})) + g(x) - g(\mathrm{x0}) + \mathrm{y0}$$

Check the constraints

In[3]:=
```
y1[x0] - y0 == 0
(D[y1[x], x] /. x → x0) - yx0 == 0
```

Out[3]= True

Out[4]= True

2.

Constrained expression

In[5]:=
```
y2[x_] := g[x] + (yf - g[xf]) + Sec[x0] (Sin[x] - Sin[xf]) (yx0 - (D[g[x], x] /. x → x0));
y2[x] // TraditionalForm
```

Out[6]//TraditionalForm=

$$\sec(\mathrm{x0})\,(\sin(x) - \sin(\mathrm{xf}))\,(\mathrm{yx0} - g'(\mathrm{x0})) + g(x) - g(\mathrm{xf}) + \mathrm{yf}$$

Check the constraints

In[7]:=
```
(D[y2[x], x] /. x → x0) - yx0 == 0
y2[xf] - yf == 0
```

Out[7]= True

Out[8]= True

3.

Constrained expression

In[9]:=
```
y3[x_] := g[x] + (y0 - g[x0]) + Sec[xf] (Sin[x] - Sin[x0]) (yxf - (D[g[x], x] /. x → xf));
y3[x] // TraditionalForm
```

Out[10]//TraditionalForm=

$$\sec(\mathrm{xf})\,(\sin(x) - \sin(\mathrm{x0}))\,(\mathrm{yxf} - g'(\mathrm{xf})) + g(x) - g(\mathrm{x0}) + \mathrm{y0}$$

Check the constraints

In[11]:=
```
y3[x0] - y0 == 0
(D[y3[x], x] /. x → xf) - yxf == 0
```

Out[11]= True

Out[12]= True