Problem 6.47 (a)

In[2]:=
```
Integrate[(y*Cos[omega*(t+eps)]-y*Cos[omega*t])^2, {y, 0, 1}]
```

Out[2]=
$$\frac{1}{3}\,(\text{Cos}[\text{omega t}]-\text{Cos}[\text{omega }(\text{eps}+\text{t})])^2$$

In[3]:=
```
Limit[%, eps→0]
```

Out[3]=
$$0$$

Problem 6.47 (b)

In[4]:=
```
Limit[(y*Cos[omega*(t+eps)]-y*Cos[omega*t])/eps, eps→0]
```

Out[4]=
$$-\text{omega y Sin}[\text{omega t}]$$

In[5]:=
```
Integrate[((y*Cos[omega*(t+eps)]-y*Cos[omega*t])/eps-%)^2, {y, 0, 1}]
```

Out[5]=
$$\frac{(-\text{Cos}[\text{omega t}]+\text{Cos}[\text{omega }(\text{eps}+\text{t})]+\text{eps omega Sin}[\text{omega t}])^2}{3\,\text{eps}^2}$$

In[6]:=
```
Limit[%, eps→0]
```

Out[6]=
$$0$$

Problem 6.50 (a)

In[11]:=
```
Integrate[(2/T)*Integrate[y*Cos[(2*Pi/T)*alpha], {alpha, t, t+T/2}], {y, 0, 1}]
```

Out[11]=
$$-\frac{\text{Sin}\left[\frac{2\,\pi\,\text{t}}{\text{T}}\right]}{\pi}$$

Problem 6.50 (b)

In[13]:=
```
Integrate[((2/T)*Integrate[y*Cos[(2*Pi/T)*alpha], {alpha, s, s+T/2}])*
  ((2/T)*Integrate[y*Cos[(2*Pi/T)*beta], {beta, t, t+T/2}]), {y, 0, 1}]
```

Out[13]=
$$\frac{4\,\text{Sin}\left[\frac{2\,\pi\,\text{s}}{\text{T}}\right]\,\text{Sin}\left[\frac{2\,\pi\,\text{t}}{\text{T}}\right]}{3\,\pi^2}$$

Problem 6.59

In[16]:=
```
Integrate[(N0/2)*Exp[I*tau*omega]/(2*Pi), {omega, -omegab, omegab}]
```

Out[16]=
$$\frac{\text{N0 Sin}[\text{omegab tau}]}{2\,\pi\,\text{tau}}$$