In[ ]:=
$$\frac{1}{1-e^{-t}} * \int_0^t e^{-u} * \left(\frac{1}{4} + \text{alpha} * e^{-u*mu}\right) * \left(\frac{1}{4} + \text{beta} * e^{-u*mu}\right) * \left(\frac{1}{4} + \text{gamma} * e^{-(t-u)*mu}\right) du$$

Out[ ]=
$$\frac{1}{64\left(1-e^{-t}\right)}\left(1 + 16\,\text{beta}\,e^{-mu\,t}\,\text{gamma} - \frac{4\,e^{-mu\,t}\,\text{gamma}}{-1+mu} + \frac{4\,\text{beta}}{1+mu} + 4\,\text{alpha}\left(\frac{1}{1+mu} + \frac{4\,e^{-mu\,t}\,\text{gamma}\,(1+4\,\text{beta}+mu)}{1+mu} + \frac{4\,\text{beta}}{1+2\,mu}\right) + e^{-t}\left(-1 - 16\,\text{beta}\,e^{-mu\,t}\,\text{gamma} + \frac{4\,\text{gamma}}{-1+mu} - \frac{4\,\text{beta}\,e^{-mu\,t}}{1+mu} - \frac{1}{(1+mu)\,(1+2\,mu)}\,4\,\text{alpha}\right.\right.$$
$$\left.\left. e^{-2\,mu\,t}\left(e^{mu\,t}\,(1+2\,mu)\,(1+4\,\text{gamma}\,(1+mu)) + 4\,\text{beta}\,(1+mu+\text{gamma}\,(4+8\,mu))\right)\right)\right)$$

In[ ]:= **InputForm[%18]**

Out[ ]//InputForm=
```
(1 + (16*beta*gamma)/E^(mu*t) -
   (4*gamma)/(E^(mu*t)*(-1 + mu)) +
   (4*beta)/(1 + mu) +
   4*alpha*((1 + mu)^(-1) +
      (4*gamma*(1 + 4*beta + mu))/
       (E^(mu*t)*(1 + mu)) +
      (4*beta)/(1 + 2*mu)) +
   (-1 - (16*beta*gamma)/E^(mu*t) +
      (4*gamma)/(-1 + mu) -
      (4*beta)/(E^(mu*t)*(1 + mu)) -
      (4*alpha*(E^(mu*t)*(1 + 2*mu)*
           (1 + 4*gamma*(1 + mu)) +
          4*beta*(1 + mu + gamma*
              (4 + 8*mu))))/(E^(2*mu*t)*
         (1 + mu)*(1 + 2*mu)))/E^t)/
 (64*(1 - E^(-t)))
```

In[ ]:=
$$\frac{1}{1 + 0.5 * e^{-3*t} - 1.5 * e^{-t}} * \int_0^t \int_0^v 3 * e^{-3*u} * e^{-(v-u)} * \left(\frac{1}{4} + \text{alpha} * e^{-u*mu}\right) * \left(\frac{1}{4} + \text{beta} * e^{-u*mu}\right) * \left(\frac{1}{4} + \text{gamma} * e^{-(v-u)*mu}\right) * \left(\frac{1}{4} + \text{delta} * e^{-v*mu}\right) * \left(\frac{1}{4} + \text{epsilon} * e^{-(t-v)*mu}\right) du\, dv$$

Out[ ]=
$$\left(3\left(-\frac{2\,\text{delta}\,(-2-8\,\text{gamma}+mu)}{-6+mu+mu^2} - \frac{32\,\text{alpha}\,\text{beta}\,\text{delta}\,(2+mu+8\,\text{gamma}\,(1+mu))}{3\,(1+mu)^2\,(2+mu)} - \frac{32\,\text{alpha}\,\text{beta}\,e^{-mu\,t}\,\text{epsilon}\,(2+mu+8\,\text{gamma}\,(1+mu))}{(1+mu)\,(2+mu)\,(3+mu)} - \frac{8\,\text{alpha}\,\text{beta}\left(1+16\,\text{delta}\,e^{-mu\,t}\,\text{epsilon}\right)(2+mu+8\,\text{gamma}\,(1+mu))}{(1+mu)\,(2+mu)\,(3+2\,mu)} + \frac{16\,\text{delta}\,\text{gamma}\,((-1+2\,\text{beta}\,(-2+mu))\,(2+mu)+2\,\text{alpha}\,(-2+mu)\,(2+8\,\text{beta}+mu))}{(-2+mu)\,(2+mu)\,(1+2\,mu)} - \left(4\,(\text{alpha}+\text{beta})\,e^{-mu\,t}\,(1+2\,\text{gamma}\,(2+mu))\right.\right.$$
$$\left.\left.\left((3+2\,mu)\left(3\,e^{mu\,t}+4\,\text{epsilon}\,(3+mu)\right)+\right.\right.\right.$$

$$
\begin{aligned}
&12\,\text{delta}\left(e^{\text{mu}\,t}\,(3+\text{mu})+4\,\text{epsilon}\,(3+2\,\text{mu})\right)\Big)\Big)\Big/\\
&(3\,(2+\text{mu})\,(3+\text{mu})\,(3+2\,\text{mu}))-2\,e^{-\text{mu}\,t}\,\text{epsilon}\left(\frac{2+8\,\text{gamma}-\text{mu}}{(-3+\text{mu})\,(-2+\text{mu})}+\right.\\
&\left.\frac{(1+\text{mu})\,(2+8\,\text{beta}+\text{mu})+8\,\text{alpha}\,(1+\text{mu}+2\,\text{beta}\,(2+\text{mu}))}{(-1+\text{mu})\,(1+\text{mu})\,(2+\text{mu})}\right)-\\
&\left(e^{-\text{mu}\,t}\left(-16\,\text{delta}\,\text{epsilon}\,(2+8\,\text{gamma}-\text{mu})\left(2+3\,\text{mu}+\text{mu}^2\right)+\right.\right.\\
&\quad e^{\text{mu}\,t}\,(-2-8\,\text{gamma}+\text{mu})\left(2+3\,\text{mu}+\text{mu}^2\right)-\\
&\quad 3\,e^{\text{mu}\,t}\,(-2+\text{mu})\,((1+\text{mu})\,(2+8\,\text{beta}+\text{mu})+8\,\text{alpha}\,(1+\text{mu}+2\,\text{beta}\,(2+\text{mu})))-\\
&\quad 48\,\text{epsilon}\,(2\,\text{gamma}\,(1+\text{mu})\,((-1+2\,\text{beta}\,(-2+\text{mu}))\,(2+\text{mu})+\\
&\qquad 2\,\text{alpha}\,(-2+\text{mu})\,(2+8\,\text{beta}+\text{mu}))+\text{delta}\,(-2+\text{mu})\\
&\qquad ((1+\text{mu})\,(2+8\,\text{beta}+\text{mu})+8\,\text{alpha}\,(1+\text{mu}+2\,\text{beta}\,(2+\text{mu}))))\Big)\Big)\Big/\\
&(6\,(-2+\text{mu})\,(1+\text{mu})\,(2+\text{mu}))+\frac{1}{(1+\text{mu})^2\left(-4+\text{mu}^2\right)}\,2\,e^{-\text{mu}\,t}\left(2\,e^{\text{mu}\,t}\,\text{gamma}\right.\\
&\quad (1+\text{mu})\,((-1+2\,\text{beta}\,(-2+\text{mu}))\,(2+\text{mu})+2\,\text{alpha}\,(-2+\text{mu})\,(2+8\,\text{beta}+\text{mu}))+\\
&\quad \text{delta}\left(32\,\text{epsilon}\,\text{gamma}\,(1+\text{mu})\,((-1+2\,\text{beta}\,(-2+\text{mu}))\,(2+\text{mu})+2\right.\\
&\qquad \text{alpha}\,(-2+\text{mu})\,(2+8\,\text{beta}+\text{mu}))+e^{\text{mu}\,t}\,(-2+\text{mu})\\
&\qquad \left.((1+\text{mu})\,(2+8\,\text{beta}+\text{mu})+8\,\text{alpha}\,(1+\text{mu}+2\,\text{beta}\,(2+\text{mu})))\right)+\\
&e^{-3\,(1+\text{mu})\,t}\left(\frac{32\,\text{alpha}\,\text{beta}\,\text{delta}\,(2+\text{mu}+8\,\text{gamma}\,(1+\text{mu}))}{3\,(1+\text{mu})^2\,(2+\text{mu})}+\right.\\
&\frac{32\,\text{alpha}\,\text{beta}\,e^{\text{mu}\,t}\,\text{epsilon}\,(2+\text{mu}+8\,\text{gamma}\,(1+\text{mu}))}{(1+\text{mu})\,(2+\text{mu})\,(3+\text{mu})}+\\
&\frac{8\,\text{alpha}\,\text{beta}\,e^{\text{mu}\,t}\left(1+16\,\text{delta}\,e^{-\text{mu}\,t}\,\text{epsilon}\right)(2+\text{mu}+8\,\text{gamma}\,(1+\text{mu}))}{(1+\text{mu})\,(2+\text{mu})\,(3+2\,\text{mu})}+\\
&\left(4\,(\text{alpha}+\text{beta})\,(1+2\,\text{gamma}\,(2+\text{mu}))\right.\\
&\quad \left((3+2\,\text{mu})\left(3\,e^{2\,\text{mu}\,t}+4\,e^{2\,\text{mu}\,t}\,\text{epsilon}\,(3+\text{mu})\right)+12\,\text{delta}\left(e^{\text{mu}\,t}\,(3+\text{mu})+\right.\right.\\
&\qquad \left.\left.4\,e^{\text{mu}\,t}\,\text{epsilon}\,(3+2\,\text{mu})\right)\right)\Big)\Big/(3\,(2+\text{mu})\,(3+\text{mu})\,(3+2\,\text{mu}))+\\
&e^{2\,(1+\text{mu})\,t}\left(\frac{2\,\text{delta}\,e^{-2\,t}\,(-2-8\,\text{gamma}+\text{mu})}{-6+\text{mu}+\text{mu}^2}-\left(16\,\text{delta}\,e^{-\text{mu}\,t}\,\text{gamma}\right.\right.\\
&\quad \left.((-1+2\,\text{beta}\,(-2+\text{mu}))\,(2+\text{mu})+2\,\text{alpha}\,(-2+\text{mu})\,(2+8\,\text{beta}+\text{mu}))\right)\Big/\\
&\quad ((-2+\text{mu})\,(2+\text{mu})\,(1+2\,\text{mu}))+2\,e^{\text{mu}\,t}\,\text{epsilon}\left(\frac{e^{-2\,t}\,(2+8\,\text{gamma}-\text{mu})}{(-3+\text{mu})\,(-2+\text{mu})}+\right.\\
&\quad \left.\frac{(1+\text{mu})\,(2+8\,\text{beta}+\text{mu})+8\,\text{alpha}\,(1+\text{mu}+2\,\text{beta}\,(2+\text{mu}))}{(-1+\text{mu})\,(1+\text{mu})\,(2+\text{mu})}\right)+\\
&\quad \left(e^{-2\,t}\left(-16\,\text{delta}\,\text{epsilon}\,(2+8\,\text{gamma}-\text{mu})\left(2+3\,\text{mu}+\text{mu}^2\right)+\right.\right.\\
&\qquad e^{\text{mu}\,t}\,(-2-8\,\text{gamma}+\text{mu})\left(2+3\,\text{mu}+\text{mu}^2\right)-3\,e^{2\,t+\text{mu}\,t}\,(-2+\text{mu})\\
&\qquad ((1+\text{mu})\,(2+8\,\text{beta}+\text{mu})+8\,\text{alpha}\,(1+\text{mu}+2\,\text{beta}\,(2+\text{mu})))-\\
&\qquad 48\,e^{2\,t}\,\text{epsilon}\,(2\,\text{gamma}\,(1+\text{mu})\,((-1+2\,\text{beta}\,(-2+\text{mu}))\,(2+\text{mu})+\\
&\qquad\quad 2\,\text{alpha}\,(-2+\text{mu})\,(2+8\,\text{beta}+\text{mu}))+\text{delta}\,(-2+\text{mu})\\
&\qquad\quad ((1+\text{mu})\,(2+8\,\text{beta}+\text{mu})+8\,\text{alpha}\,(1+\text{mu}+2\,\text{beta}\,(2+\text{mu}))))\Big)\Big)\Big/\\
&\quad (6\,(-2+\text{mu})\,(1+\text{mu})\,(2+\text{mu}))-\frac{1}{(1+\text{mu})^2\left(-4+\text{mu}^2\right)}\,2\,e^{-\text{mu}\,t}\\
&\quad \left(2\,e^{\text{mu}\,t}\,\text{gamma}\,(1+\text{mu})\,((-1+2\,\text{beta}\,(-2+\text{mu}))\,(2+\text{mu})+2\,\text{alpha}\,(-2+\text{mu})\right.
\end{aligned}
$$

$$(2 + 8\,\text{beta} + \text{mu})) + \text{delta}\left(32\,\text{epsilon}\,\text{gamma}\,(1 + \text{mu})\,((-1 + 2\,\text{beta}\,(-2 + \text{mu}))\,(2 + \text{mu}) + 2\,\text{alpha}\,(-2 + \text{mu})\,(2 + 8\,\text{beta} + \text{mu})) + e^{\text{mu}\,t}\,(-2 + \text{mu})\,((1 + \text{mu})\,(2 + 8\,\text{beta} + \text{mu}) + 8\,\text{alpha}\,(1 + \text{mu} + 2\,\text{beta}\,(2 + \text{mu})))\right)\Big)\Big)\Big)\Big) \Big/ \left(1024\left(1 + 0.5\,e^{-3\,t} - 1.5\,e^{-t}\right)\right)$$

In[•]:= **InputForm[%23]**

Out[•]//InputForm=

```
(3*((-2*delta*(-2 - 8*gamma + mu))/
     (-6 + mu + mu^2) -
    (32*alpha*beta*delta*(2 + mu +
       8*gamma*(1 + mu)))/
     (3*(1 + mu)^2*(2 + mu)) -
    (32*alpha*beta*epsilon*
      (2 + mu + 8*gamma*(1 + mu)))/
     (E^(mu*t)*(1 + mu)*(2 + mu)*
      (3 + mu)) - (8*alpha*beta*
      (1 + (16*delta*epsilon)/
        E^(mu*t))*(2 + mu +
       8*gamma*(1 + mu)))/
     ((1 + mu)*(2 + mu)*(3 + 2*mu)) +
    (16*delta*gamma*
      ((-1 + 2*beta*(-2 + mu))*
        (2 + mu) + 2*alpha*(-2 + mu)*
        (2 + 8*beta + mu)))/
     ((-2 + mu)*(2 + mu)*(1 + 2*mu)) -
    (4*(alpha + beta)*
      (1 + 2*gamma*(2 + mu))*
      ((3 + 2*mu)*(3*E^(mu*t) +
         4*epsilon*(3 + mu)) +
       12*delta*(E^(mu*t)*(3 + mu) +
         4*epsilon*(3 + 2*mu))))/
     (3*E^(mu*t)*(2 + mu)*(3 + mu)*
      (3 + 2*mu)) -
    (2*epsilon*((2 + 8*gamma - mu)/
        ((-3 + mu)*(-2 + mu)) +
       ((1 + mu)*(2 + 8*beta + mu) +
         8*alpha*(1 + mu + 2*beta*
            (2 + mu)))/((-1 + mu)*
        (1 + mu)*(2 + mu))))/
     E^(mu*t) -
    (-16*delta*epsilon*(2 + 8*gamma -
        mu)*(2 + 3*mu + mu^2) +
      E^(mu*t)*(-2 - 8*gamma + mu)*
       (2 + 3*mu + mu^2) -
      3*E^(mu*t)*(-2 + mu)*
       ((1 + mu)*(2 + 8*beta + mu) +
        8*alpha*(1 + mu + 2*beta*
           (2 + mu))) - 48*epsilon*
       (2*gamma*(1 + mu)*
         ((-1 + 2*beta*(-2 + mu))*
           (2 + mu) + 2*alpha*
           (-2 + mu)*(2 + 8*beta +
            mu)) + delta*(-2 + mu)*
```

```
      ((1 + mu)*(2 + 8*beta + mu) +
       8*alpha*(1 + mu + 2*beta*
          (2 + mu)))))/
  (6*E^(mu*t)*(-2 + mu)*(1 + mu)*
   (2 + mu)) +
 (2*(2*E^(mu*t)*gamma*(1 + mu)*
     ((-1 + 2*beta*(-2 + mu))*
       (2 + mu) + 2*alpha*(-2 + mu)*
       (2 + 8*beta + mu)) +
    delta*(32*epsilon*gamma*
       (1 + mu)*
       ((-1 + 2*beta*(-2 + mu))*
         (2 + mu) + 2*alpha*
         (-2 + mu)*(2 + 8*beta +
          mu)) + E^(mu*t)*(-2 + mu)*
       ((1 + mu)*(2 + 8*beta +
          mu) + 8*alpha*(1 + mu +
          2*beta*(2 + mu))))))/
  (E^(mu*t)*(1 + mu)^2*
   (-4 + mu^2)) +
 ((32*alpha*beta*delta*(2 + mu +
     8*gamma*(1 + mu)))/
   (3*(1 + mu)^2*(2 + mu)) +
  (32*alpha*beta*E^(mu*t)*epsilon*
    (2 + mu + 8*gamma*(1 + mu)))/
   ((1 + mu)*(2 + mu)*(3 + mu)) +
  (8*alpha*beta*E^(mu*t)*
    (1 + (16*delta*epsilon)/
      E^(mu*t))*(2 + mu +
     8*gamma*(1 + mu)))/
   ((1 + mu)*(2 + mu)*
    (3 + 2*mu)) +
  (4*(alpha + beta)*
    (1 + 2*gamma*(2 + mu))*
    ((3 + 2*mu)*(3*E^(2*mu*t) +
       4*E^(2*mu*t)*epsilon*
        (3 + mu)) + 12*delta*
      (E^(mu*t)*(3 + mu) +
       4*E^(mu*t)*epsilon*
        (3 + 2*mu))))/(3*(2 + mu)*
    (3 + mu)*(3 + 2*mu)) +
  E^(2*(1 + mu)*t)*
   ((2*delta*(-2 - 8*gamma + mu))/
     (E^(2*t)*(-6 + mu + mu^2)) -
    (16*delta*gamma*
      ((-1 + 2*beta*(-2 + mu))*
        (2 + mu) + 2*alpha*
        (-2 + mu)*(2 + 8*beta +
         mu)))/(E^(mu*t)*(-2 + mu)*
      (2 + mu)*(1 + 2*mu)) +
    2*E^(mu*t)*epsilon*
     ((2 + 8*gamma - mu)/
       (E^(2*t)*(-3 + mu)*
        (-2 + mu)) +
      ((1 + mu)*(2 + 8*beta +
```

```
          mu) + 8*alpha*(1 + mu +
          2*beta*(2 + mu)))/
        ((-1 + mu)*(1 + mu)*
         (2 + mu))) +
      (-16*delta*epsilon*
         (2 + 8*gamma - mu)*
         (2 + 3*mu + mu^2) +
        E^(mu*t)*(-2 - 8*gamma + mu)*
         (2 + 3*mu + mu^2) -
        3*E^(2*t + mu*t)*(-2 + mu)*
         ((1 + mu)*(2 + 8*beta +
           mu) + 8*alpha*(1 + mu +
           2*beta*(2 + mu))) -
        48*E^(2*t)*epsilon*
         (2*gamma*(1 + mu)*
           ((-1 + 2*beta*(-2 + mu))*
           (2 + mu) + 2*alpha*
           (-2 + mu)*(2 + 8*beta +
           mu)) + delta*(-2 + mu)*
           ((1 + mu)*(2 + 8*beta +
           mu) + 8*alpha*(1 + mu + 2*
           beta*(2 + mu)))))/
       (6*E^(2*t)*(-2 + mu)*(1 + mu)*
        (2 + mu)) -
      (2*(2*E^(mu*t)*gamma*(1 + mu)*
          ((-1 + 2*beta*(-2 + mu))*
           (2 + mu) + 2*alpha*
           (-2 + mu)*(2 + 8*beta +
           mu)) + delta*
          (32*epsilon*gamma*(1 + mu)*
           ((-1 + 2*beta*(-2 + mu))*(
           2 + mu) + 2*alpha*(-2 +
           mu)*(2 + 8*beta + mu)) +
           E^(mu*t)*(-2 + mu)*
           ((1 + mu)*(2 + 8*beta +
           mu) + 8*alpha*(1 + mu +
           2*beta*(2 + mu))))))/
       (E^(mu*t)*(1 + mu)^2*
        (-4 + mu^2))))/
   E^(3*(1 + mu)*t)))/
(1024*(1 + 0.5/E^(3*t) - 1.5/E^t))
```