```
> # Sample Problem 10
> # answer check part (a)
> f:=t*exp(2*t)+2*t*sin(3*t)+3*exp(-t)*cos(4*t);
```

$$f := t\,e^{2\,t} + 2\,t\sin(3\,t) + 3\,e^{-t}\cos(4\,t) \tag{1}$$

```
> with(inttrans): # load laplace package
> laplace(f,t,s);
```

$$\frac{1}{(s-2)^2} + \frac{12\,s}{\left(s^2+9\right)^2} + \frac{3}{2\,(s+1-4\,\mathrm{I})} + \frac{3}{2\,(s+1+4\,\mathrm{I})} \tag{2}$$

```
> # The last two fractions simplify to 3(s+1)/((s+1)^2+16).
> # answer check part (b)
> F:=16/(s^2+4)+(s+1)/(s^2-2*s+10)+2/(s^2+16);
```

$$F := \frac{16}{s^2+4} + \frac{s+1}{s^2-2\,s+10} + \frac{2}{s^2+16} \tag{3}$$

```
> invlaplace(F,s,t);
```

$$8\sin(2\,t) + \frac{1}{2}\sin(4\,t) + \frac{1}{3}\,e^{t}\,(3\cos(3\,t) + 2\sin(3\,t)) \tag{4}$$

```
> # answer check part (c)
> de:=diff(x(t),t,t)+256*x(t)=1;ic:=x(0)=1,D(x)(0)=0;
```

$$de := \frac{d^2}{dt^2}\,x(t) + 256\,x(t) = 1$$

$$ic := x(0) = 1,\ \mathrm{D}(x)(0) = 0 \tag{5}$$

```
> dsolve([de,ic],x(t));
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$$x(t) = \frac{1}{256} + \frac{255}{256}\cos(16\,t) \tag{6}$$

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> # answer check part (c), partial fractions
> convert((s^2+1)/(s*(s^2+256)),parfrac,s);
```

$$\frac{255}{256}\,\frac{s}{s^2+256} + \frac{1}{256\,s} \tag{7}$$