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> # Sample quiz 11
> # answer check problem 2(a)
> f:=t*exp(2*t)+2*t*sin(3*t)+3*exp(-t)*cos(4*t);
      f:=te2t+2t sin(3t)+3e-t cos(4t)
```

(1)

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

$$\frac{1}{(s-2)^2} + \frac{12s}{(s^2+9)^2} + \frac{3}{2(s+1-4I)} + \frac{3}{2(s+1+4I)}$$

(2)

```
> # The last two fractions simplify to 3(s+1)/((s+1)^2+16).
```

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> # answer check problem 2(b)
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> F:=16/(s^2+4)+(s+1)/(s^2-2*s+10)+2/(s^2+16);
```

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

(3)

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

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

(4)

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> # answer check problem 2(c)
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```
> de:=diff(x(t),t,t)+256*x(t)=1;ic:=x(0)=1,D(x)(0)=0;
```

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

$$ic:=x(0) = 1, D(x)(0) = 0$$

(5)

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> dsolve([de,ic],x(t));
```

$$x(t) = \frac{1}{256} + \frac{255}{256} \cos(16t)$$

(6)

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

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

(7)