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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);

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

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

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

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

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$$F := \frac{16}{s^2+4} + \frac{s+1}{s^2-2s+10} + \frac{2}{s^2+16} \quad (3)$$

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> invlaplace(F,s,t);

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

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

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

$$ic := x(0) = 1, D(x)(0) = 0 \quad (5)$$

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

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$$x(t) = \frac{1}{256} + \frac{255}{256} \cos(16 t) \quad (6)$$

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

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$$\frac{1}{256 s} + \frac{255}{256} \frac{s}{s^2+256} \quad (7)$$