

**Quiz 7, Math 246, Professor David Levermore**  
**Thursday, 29 October 2020**

This formative assessment helps you see how well you understand the material. To get an accurate assessment please do not use books, notes, or electronic aids. Show your reasoning for full credit. Good luck!

**Short Table:**  $\mathcal{L}[t^n](s) = \frac{n!}{s^{n+1}}$  for  $s > 0$ ,  $\mathcal{L}[\cos(bt)](s) = \frac{s}{s^2 + b^2}$  for  $s > 0$ .

- (1) [4] Use the definition of the Laplace transform to compute  $\mathcal{L}[f](s)$  for the function  $f(t) = u(t - 5)e^{-3t}$ , where  $u$  is the unit step function.
- (2) [1] Find the exponential order of  $h(t) = u(t - 4)t^2e^{-3t} \sin(5t)$ .
- (3) [5] Find the Laplace transform  $X(s)$  of the solution  $x(t)$  of the initial-value problem

$$x'' + 4x' + 29x = 7 \cos(3t), \quad x(0) = 2, \quad x'(0) = -4.$$

DO NOT solve for  $x(t)$ , just  $X(s)$ ! You should refer to the short table above.