APMA 0350 – MIDTERM 2

Name	
Brown ID	

1. *(7 points)* Use **undetermined coefficients** to find a **particular** solution to

$$y'' + 9y = 3\sin(3t)$$

$y_p =$

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2. *(6 points)* Use **variation of parameters** to find a **particular** solution to

$$y'' + 9y = 3\sin(3t)$$

You do **NOT** need to simplify your **final** answer
You do **NOT** need to check that your answers match
You may use $\sin^2(\theta) = \frac{1}{2} - \frac{1}{2}\cos(2\theta)$ and $\sin(2\theta) = 2\sin(\theta)\cos(\theta)$

$y_p =$	

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3. *(8 points)* Use **Laplace transforms** to solve

$$\begin{cases} y'' + 6y' + 10y = 10f(t) \\ y(0) = 0 \\ y'(0) = 0 \end{cases} \quad \text{where } f(t) = \begin{cases} 3 & \text{if } 0 \le t < 4 \\ 1 & \text{if } 4 \le t < 8 \\ 5 & \text{if } t \ge 8 \end{cases}$$

Note: You're allowed to use without proof that

$$\frac{10}{s(s^2+6s+10)} = \left(\frac{1}{s}\right) - \left(\frac{s+6}{s^2+6s+10}\right)$$

$y =$

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4. *(4 points)* Use the **definition** of the Laplace transform to find

$$\mathcal{L}\left\{t^4\right\}$$

You may assume that any terms at ∞ are 0
I recommend using tabular integration

Answer:	

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