APMA 0350 – MIDTERM 2

Name	
Brown ID	
Signature	

1. *(7 points)* Use **undetermined coefficients** to solve

$$y'' + 9y = 5\cos(2t) - 10\sin(2t)$$

$y =$	

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2. *(7 points)* Use **variation of parameters** to solve

$$y'' - 5y' + 6y = 2e^{2t}$$

$y =$	

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3. *(7 points)* Use **Laplace transforms** to solve

$$\begin{cases} y'' - 4y' + 4y = 4\,u_5(t) \\ y(0) = 0 \\ y'(0) = 0 \end{cases}$$

Note: You're allowed to use without proof that

$$\frac{4}{s(s^2 - 4s + 4)} = \left(\frac{1}{s}\right) - \left(\frac{1}{s-2}\right) + \frac{2}{(s-2)^2}$$

$y =$	

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4. *(4 points)* Use **Laplace transforms** to calculate

$$\int_0^1 x^2 (1-x)^4 \, dx$$

Note: You can leave your answer in terms of factorials.

Hint: The $u-$sub $u = \tau/t$ might be useful

Answer:	

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