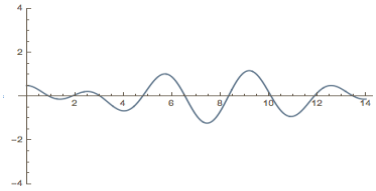
MATH 316D W05

DD1 Individual Quiz

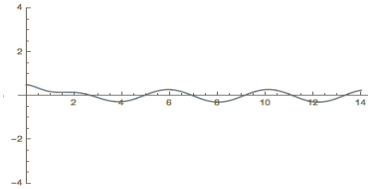
1. **Keep** but change the wording to, "A spring with a spring constant of k=8 $\frac{N}{m}$ has a mass of m=2 kg attached to it. The spring is in a vacuum and does not have a dashpot with any damping viscosity. The spring also has a forcing function of $f(t) = 2\sin\frac{3t}{2}$. We also see that the spring was displaced by .5 m and has no initial velocity." The **correct** answer is $\implies$ $\mathbf{2y'' + 0y' + 8y = 2\sin\frac{3t}{2}; y(0) = .5, y'(0) = 0}$.

2. **Keep** but the correct answer is not present. Change the answers to:

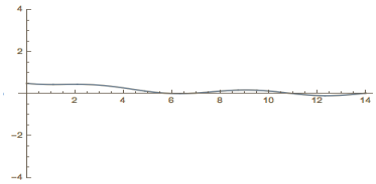
   (a) **Correct** Q2-1



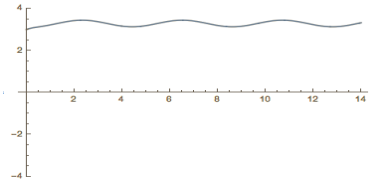
   (b) Q2-2



   (c) Q2-3



   (d) Q2-4



3. **Change** to : "Find the inverse Laplace Transform of the given F(s) function."
   $F(s) = \frac{3}{(s-2)^2}$
   (a) $f(t) = \frac{3}{\sqrt{2}}\sin\sqrt{2}t$
   (b) $f(t) = 3e^{2t}t^2$
   (c) $f(t) = 3e^{2t}t \implies$ Correct
   (d) $f(t) = 3e^{2t}\sin t$

4. **Keep.**

5. **Keep.**

DD2 Group Quiz

1. **Add.** "A mass of 2 kg is attached to a spring with a spring constant of 100 $\frac{N}{m}$, it is suspended from the ceiling and hangs in equilibrium undisturbed (the system is subject to acceleration due to gravity). It is then driven by a periodic force, $f(t) = 4\sin 7t$, with air present so that the system experiences drag with a drag coefficient of 1 $\frac{kg}{s}$. Identify the model that most accurately represents this system."

   (a) $2y'' + 100y = 4\sin 7t + 2g$; $y(0) = 0$, $y'(0) = 0$

   (b) $y'' + y' + 50y = 2\sin 7t + g$; $y(0) = 0$, $y'(0) = 0$

   (c) $2y'' + y' + 100y = 4\sin 7t + 2g$; $y(0) = 0$, $y'(0) = 0$ $\implies$ **Correct**

   (d) $y'' + \frac{1}{2}y' + 50y = 0$; $y(0) = 0$, $y'(0) = 0$

2. **Keep** (previously question 1). Please restate the first sentence of the question so that it reads as: "An RLC circuit has a resistor with a resistance of 4 Ω, an inductor with an inductance of 2 H, and a capacitor with a capacitance of 0.015 F, in series."

3. **Keep** (previously question 2). Please reword to, "Take the model from question 2 and use Mathematica to find and plot the solution. Select the graph that most accurately represents your work."

4. **Keep** (previously question 3). Please fix the directions so that they read as: "Find the Heaviside form of f(t)...".

5. **Keep** (previously question 4). Please restate the question so that it is as follows: "What is the Laplace Transform of $t\ u(t-2)$?"

6. **Change** (previously question 5). "Solve the following differential equation using the method of Laplace Transforms."

   $y'' - 2y' - 3y = u(t-3)$; $y(0) = 2$, $y'(0) = 0$

   (a) $y(t) = u(t-3)\left[\frac{e^{3(t-3)}}{12} + \frac{e^{-(t-3)}}{4} - \frac{1}{3}\right] + \frac{e^{3t}}{2} + \frac{3e^{-t}}{2}$ $\implies$ **Correct**

   (b) $y(t) = u(t-3)\left[\frac{e^{3(t-3)}}{12} + \frac{e^{-(t-3)}}{4} - \frac{1}{3}\right] + \frac{e^{3t}}{2} - \frac{e^{-t}}{2}$

   (c) $y(t) = u(t-3)\left[\frac{e^{3t}}{12} + \frac{e^{-t}}{4} - \frac{1}{3}\right] + \frac{e^{3t}}{2} + \frac{3e^{-t}}{2}$

   (d) None of the above.

DD3 Weekly Quiz

1. **Keep** but the correct answer is not present. Change answers to the following:

   (a) $y(t) = \frac{53}{50}e^{-t} + \frac{65}{50}e^{-t} - \frac{3}{54}\cos 3t - \frac{2}{25}\sin 3t$

   (b) $y(t) = \frac{53}{50}e^{-t} + \frac{65}{50}te^{-t} - \frac{3}{54}\cos 3t - \frac{2}{25}\sin 3t$ $\implies$ **Correct**

   (c) $y(t) = e^{-t} + te^{-t}$

   (d) $y(t) = \frac{3}{50}e^{-t} + \frac{13}{10}te^{-t} - \frac{3}{54}\cos 3t - \frac{2}{25}\sin 3t$

2. **Keep** but the correct answer is not present. Change answers to the following:

   (a) $y(t) = u(t-2)[\ \frac{2}{3}e^{-2t} + \frac{4}{3}e^{t} - 2\ ] + \frac{1}{3}\ (e^{-2t} + 2e^{t})$

   (b) $y(t) = u(t-2)[\ \frac{2}{3}e^{4-2t} + \frac{4}{3}e^{t-2} - 2\ ] + \frac{1}{3}\ (e^{-2t} + 2e^{t})$ $\implies$ **Correct**

   (c) $y(t) = u(t-2)[\ \frac{2}{3}e^{4-2t} + \frac{4}{3}e^{t-2} - 2\ ] + \frac{1}{3}\ e^{-2t}(-1 + e^{3t})$

   (d) None of the above.

3. **Keep** and please make sure that an appropriate answer is $\implies l(t) = \frac{1}{3}\ e^{-t}\sin 3t$

4. **Keep** and please make sure that an appropriate answer is $\implies y(t) = \frac{1}{5}\ (e^{-2t} - \cos t + 2\sin t)$

5. **Keep** and please make sure that an appropriate answer is $\implies y(t) = \frac{1}{5}\ (9 - 9e^{2t}\cos t + 18e^{2t}\sin t)$

6. **Keep** please make sure that an appropriate answer is $\implies y(t) = \frac{1}{12}\ (-\cos 3t + 13e^{t}\cos\sqrt{2}t - \sin 3t - 5\sqrt{2}e^{t}\sin\sqrt{2}t)$