

Note. Do **not** approx.: If your result is “ $\sin(\sqrt{\pi})$ ” then write that rather than .9797... Write expressions unambiguously e.g. “ $1/a+b$ ” should be bracketed either $[1/a]+b$ or $1/[a+b]$. (Be careful with **negative** signs!)

Use **cts** for “continuous” and **IVP** for “initial value problem”.

Y1: Show no work.

z If $\lim_{x \rightarrow 0+} 8/x$ equals ∞ , then $\lim_{x \rightarrow 0+} 5/x$ is Circle:
Prof. King's cap a snowplow ↻

a Let $L := [D + 2I][D - 3I]^2$. Then a gen.soln y to DE $L(y) = 0$ is

$$y(t) = A \cdot \underline{\hspace{2cm}} + B \cdot \underline{\hspace{2cm}} + C \cdot \underline{\hspace{2cm}},$$

where A, B, C are arbitrary complex numbers.

b (With operator L as above.) Please find a solution $z(t) = \underline{\hspace{2cm}}$ to DE $L(z) = e^{3t}$.

c Find a soln $q(t) = \underline{\hspace{2cm}}$ to DE $q'' + 4q' + 4q = t^5$.

d Directly compute the Wronskian $W[x^3, \sin(x)] = \underline{\hspace{2cm}}$.

e Use *Bill's Identity* (well... Abel's Identity, actually) to compute the Wronskian, $W = \underline{\hspace{2cm}}$, of two linearly independent solns to DE

$$x \cdot y'' - [x - 1] \cdot y' + 3y = 0.$$

[Hint: Don't bother computing solns y .]

Essay question

Please write (on your own paper) in *complete grammatical sentences* a soln to the following problem. Write every 3rd line, please. (Don't Scrunch!) **Also fill in the blank.**

Y2: Consider a large tank holding 1200L (here, L=liters) of pure water, into which a brine solution (salt) begins to flow at a constant rate of 6L/min. The solution inside the tank is kept well stirred and is flowing *out* of the tank also at 6L/min.

Suppose that the concentration of salt in the entering-the-tank brine is 3kg/L. Then *the concentration of salt in the tank will reach 1kg/L at time $T =$* .

Draw a large (use a whole page) *carefully labelled* picture of the tank and quantities and concentrations. Carefully *define* all quantities that **you** introduce in your solution. Carefully *explain* how you obtained your DE, then how you solved it, then how you solved the IVP so as to compute T .

End of Y-class

Y1: 280pts

Y2: 105pts

Total: 385pts

Print
name

Ord:

HONOR CODE: “*I have neither requested nor received help on this exam other than from my professor.*”

Signature:

Filename: Classwork/DiffyQ/D2003g/y-cl.DfyQ2003g.latex
As of: Friday 04Sep2015. Typeset: 4Sep2015 at 00:04.