Math 45, Fall 2020
August 31, Quiz 01

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Please show and explain your work where necessary. Good luck!!

1. (*5 points*) For each of the following,
Circle all of the following expression which are differential equations.

i) $g'(x) + g(x) = 0$

ii) $\left(\frac{d}{dt}\right)^5 f(t) + \frac{d}{dt} f(t) + f(t) = 0$

iii) $\sin(x)\dfrac{d^2f}{dx^2} + \dfrac{df}{dx} + e^x = \dfrac{d^3f}{dx^3}$

iv) ~~$y''' + y' + x$~~ Not an equation

v) $f'(x) = f(x)$

vi) $y^2 x = x^2$

vii) $\csc(y'') + \sin(x) - y = 0$

viii) $x^2\dfrac{\partial^2 y}{\partial t^2} + y^2\dfrac{\partial x}{\partial s} = s + t$

ix) $e^{y''} + e^x = 3y$

x) $x\dfrac{\partial^2 y}{\partial t^2} = y\dfrac{\partial x}{\partial s}$

2. (*3 points*) For the following equations, provide the *dependent variable*.

a. (*1 pt*) $f'(x) - f(x) = 0$ $f(x)$

b. (*1 pt*) $\dfrac{d^2g}{dt^2} - e^t g(t) = 3$ g

c. (*1 pt*) $\sin(x)y' + y = 0$ y?

$\frac{dx}{dt}$ & $\frac{dy}{dt}$ Dependent Independent

3. (*2 points*) Consider the function $y = x^3$.

a. (*1 pt*) Compute y' and y''.

$[x^3]' = 3x^2$, $[x^3]'' \to [3x^2]' = 6x$

b. (*1 pt*) Does y satisfy the differential equation $x^2y'' - 5y = 0$? Justify your answer.

?

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