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1. (1 point) Select the following which are differential equations.

- A. $y = x$
- B. $y'' + 3$
- C. $s^{(2)} = 5$
- D. $x'' - 2x' + 3x = 0$
- E. $y^3 - y^2 + y = 0$
- F. $y'y = 2$
- G. $\ln(y'') + \sin(y') = e^y$
- H. $\frac{d^2y}{dx^2} - e^x \frac{dy}{dx} + \sin(x) = 2$
- I. $y' = 2y$
- J. None of the above

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2. (1 point)

State what the independent and dependent variables are in the differential equation $y'' + yx = 2x$.
Independent variable: _____
Dependent variable: _____

State what the independent and dependent variables are in the differential equation $\frac{d^2x}{dy} = 15$.
Independent variable: _____
Dependent variable: _____

Which of the following is NOT a correct partial derivative of the 4-variable function $g(x,y,z,w) = x^6 \ln(4y) e^{7z} \cos(4w)$.

- A. $\frac{\partial g}{\partial x} = 6x^5 \ln(4y) e^{7z} \cos(4w)$
- B. $\frac{\partial g}{\partial w} = -4x^6 \ln(4y) e^{7z} \sin(4w)$
- C. $\frac{\partial g}{\partial y} = \frac{x^6 e^{7z} \cos(4w)}{y}$
- D. $\frac{\partial g}{\partial z} = -7x^6 \ln(4y) e^{7z} \sin(4w)$

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4. (1 point)

Find the partial derivatives $\frac{\partial f}{\partial x}$ and $\frac{\partial f}{\partial y}$ for the function $f(x,y) = \sin(x^9 y^6)$.

$\frac{\partial f}{\partial x} =$ _____ help (formulas)
$\frac{\partial f}{\partial y} =$ _____ help (formulas)

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5. (1 point) Select the following which are ordinary differential equations.

- A. $\frac{d^3y}{dx^3} - \sin(x) \frac{d^2y}{dx^2} + \ln(x) = \pi$
- B. $y' - 2y = 3$
- C. $\ln(y'') + e^{y'} = e^y$
- D. $(y')^2 = y$
- E. $\frac{\partial h}{\partial r} + \frac{\partial h}{\partial s} = 5$
- F. $x^{(57)} - 2x''' + 3x = 0$
- G. $\frac{\partial^2 f}{\partial x^2} - \frac{\partial f}{\partial y} = 0$

- H. $y''' + x$
- I. $y^5 + y' = y$
- J. $\frac{df}{dx} + \frac{dg}{dx} = 0$
- K. None of the above

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6. (1 point) Select the following which are linear differential equations.

- A. $x^{(57)} - 2x''' + 3x = 0$
- B. $\ln(y'') + e^{y'} = e^y$
- C. $\frac{df}{dx} + \frac{dg}{dx} = 0$
- D. $\frac{\partial^2 f}{\partial x^2} - \frac{\partial f}{\partial y} = 0$
- E. $\frac{d^3y}{dx^3} - \sin(x)\frac{d^2y}{dx^2} + \ln(x) = \pi$
- F. $y^5 + y' = y$
- G. $y''' + x$
- H. $y' - 2y = 3$
- I. $(y')^2 = y$
- J. $\frac{\partial h}{\partial r} + \frac{\partial h}{\partial s} = 5$
- K. $\frac{\partial h}{\partial r} + \left(\frac{\partial h}{\partial s}\right)^4 = 5$
- L. None of the above

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7. (1 point)

$(1-x)y'' - 4xy' + 5y = \cos(x)$	is a	?	?	differential equation with
$x\frac{d^3y}{dx^3} - \left(\frac{dy}{dx}\right)^4 = 0$	is a	?	?	differential equation with
$\frac{\partial^2 z}{\partial x^2} + \frac{\partial z}{\partial y} + y = \cos(x+y)$	is a	?	?	differential equation with
$\frac{d^2y}{dx^2} = \sqrt{1 + \left(\frac{dy}{dx}\right)^2}$	is a	?	?	differential equation with
$\frac{dy}{dx} = \frac{\cos(y)}{y}$	is a	?	?	differential equation with
$\frac{\partial^2 z}{\partial x \partial y} + (xy)^2 = 0$	is a	?	?	differential equation with
$y'(1-4t)y + 5y = t$	is a	?	?	differential equation with
$y' - (1-y'')y' = t^3 - t$	is a	?	?	differential equation with

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8. (1 point)
State the order of the given differential equations below.

$x^2\frac{dy}{dx} = 9x$ has order: _____

$\frac{\partial^4 g}{\partial r^4} - e^{r^2t^3}\frac{\partial^3 g}{\partial y^3} = rt$ has order: _____

$\sin(y^{(7)}) + y' - 3x = 0$ has order: _____

$x^{(6)} = x$ has order: _____

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9. (1 point)
Determine if the following differential equations are in differential form, normal form, or standard form.

(a) The equation $e^{rs}\,dr - s\,ds = 0$ is in
- Choose
- differential
- normal
- standard

form.

(b) The equation $\frac{d^4f}{dx^4} - e^x\frac{d^2f}{dx^2} - x = 0$ is in
- Choose
- differential
- normal
- standard

form.

(c) The equation $y' = y - 3$ is in
- Choose
- differential
- normal
- standard

form.

(d) The equation $x''' - t^2x' + x = 0$ is in

- Choose
- differential
- normal
- standard

form.

(e) The equation $\dfrac{dg}{ds} = \cos(s)g + s^2$ is in

- Choose
- differential
- normal
- standard

form.

(f) The equation $x^2\,dx + y^2\,dy = 0$ is in

- Choose
- differential
- normal
- standard

form.

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10. (1 point)
Enter a value for π

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