**Matthew Mendoza** **Math-45-Krauel-F20**

**Assignment Math45-Homework-WEEK-02 due 09/12/2020 at 11:59pm PDT**

---

**1.** (1 point)

? 1. Which differential equation below is in normal form?

? 2. Which differential equation below is in differential form?

A. $(y+\sin(\theta))\,dy + y\theta\,d\theta = 0$

B. $y''' = ty'' - t^3y' + y$

---

**2.** (1 point)

Determine the order of the given differential equation and state whether the equation is linear or nonlinear.

$$(\sin\theta)y^{(7)} - (\cos\theta)y' = 7$$

(a) The order of this differential equation is _____.

(b) The equation is [Choose/Linear/Nonlinear].

---

**3.** (1 point)

Determine the order of the given differential equation and state whether the equation is linear or nonlinear.

$$\frac{d^4u}{dr^4} + \frac{du}{dr} + 6u = \cos(r+u)$$

(a) The order of this differential equation is _____.

(b) The equation is [Choose/Linear/Nonlinear].

---

Which of the following functions satisfies the differential equation $(x+1)y' - y + 2\ln(1+x) = 3$?

- A. $y = \ln(x+x^2)$
- B. $y = e^x$
- C. $y = x + 2\ln(1+x)$

---

Note that $\phi(x) = \ln(1+2x)$ satisfies the differential equation $(2x+1)\ln(1+2x)y' - 2y = 0$. On what interval is $\phi$ a solution for this differential equation?

- A. $(-\infty, \infty)$
- B. $(-1, \infty)$
- C. $\left(-\frac{1}{2}, \infty\right)$
- D. $[-1, \infty)$
- E. $\left[-\frac{1}{2}, \infty\right)$

---

**6.** (1 point)

? 1. Which statement of sets below best describes the domain of the function $f(x) = \dfrac{1}{1-x}$?

? 2. Which statement of sets below best describes the interval on which the function $f(x) = \dfrac{1}{1-x}$ is a solution to the differential equation $y' = y^2$?

A. $(-\infty, 1)$ or $(1, \infty)$

B. $(-\infty, 1)$ and $(1, \infty)$

---

The function $y = c_1e^{3x} + c_2xe^{3x}$ is a two-parameter family of solutions for which of the following differential equations?

- A. $y'' - 6y' + 9y = 0$
- B. $y' = y$
- C. $y'' + 6y' - 9y = 0$

**8.** (1 point)

Find the value $k$ such that $y = e^{kx}$ is a solution to the differential equation $7y' + 4y = 0$.

The value is $k =$ _____

**9.** (1 point) Find the two values of $k$ such that $y = x^k$ is a solution to the differential equation $xy'' + 9y' = 0$. The values are $k =$ _____ and $k =$ _____.

**10.** (1 point) Find the two values of $k$ such that the constant function $y = k$ is a solution to the differential equation $y' = y^2 - 10y + 21$. The values are $k =$ _____ and $k =$ _____.

**11.** (1 point) Find the two values of $k$ such that $y = x^k$ is a solution to the differential equation $xy'' + 9y' = 0$. The values are $k =$ _____ and $k =$ _____.

**12.** (1 point)

Let $y' = 2x$.

Find all values of $r$ such that $y = rx^2$ satisfies the differential equation. If there is more than one correct answer, enter your answers as a comma separated list.

$r =$ _____ help (numbers)