6.3/6.2 Solving Differential Equations Formative Check-in Name: _____ Period:____

1)

Given the differential equation $\frac{dy}{dx} = -\frac{2x}{y^2}$, find the particular solution, $y = f(x)$, with the initial condition $f(-1) = 3$.

A) $y = \sqrt{-2x + 3}$

B) $y = \sqrt[3]{-3x^2 + 30}$

C) $y = \sqrt[3]{-3x^2 + 24}$

D) $y = \sqrt{-2x + 7}$

E) $y = \sqrt{-3x^2 - 10}$

6.3/6.2 Solving Differential Equations Formative Check-in Name: _____ Period:____

1)

Given the differential equation $\frac{dy}{dx} = -\frac{2x}{y^2}$, find the particular solution, $y = f(x)$, with the initial condition $f(-1) = 3$.

A) $y = \sqrt{-2x + 3}$

B) $y = \sqrt[3]{-3x^2 + 30}$

C) $y = \sqrt[3]{-3x^2 + 24}$

D) $y = \sqrt{-2x + 7}$

E) $y = \sqrt{-3x^2 - 10}$

2) Given the differential equation $\frac{y'}{3-x} = 6y$, find the particular solution, $y = f(x)$, with the initial condition f(0) = 2

A) $y = \sqrt{-\frac{3}{2}x^2 + x + 2}$

B) $y = \sqrt{-3x^2 + 36x + 4}$

C) $y = \ln|18x - 3x^2| + 2$

D) $y = e^{18x-3x^2} + 2$

E) $y = 2e^{18x-3x^2}$

---

2) Given the differential equation $\frac{y'}{3-x} = 6y$, find the particular solution, $y = f(x)$, with the initial condition f(0) = 2

A) $y = \sqrt{-\frac{3}{2}x^2 + x + 2}$

B) $y = \sqrt{-3x^2 + 36x + 4}$

C) $y = \ln|18x - 3x^2| + 2$

D) $y = e^{18x-3x^2} + 2$

E) $y = 2e^{18x-3x^2}$

6.3/6.2 Solving Differential Equations Formative Check-in Name: Key Period:____

1)

Given the differential equation $\frac{dy}{dx} = -\frac{2x}{y^2}$, find the particular solution, $y = f(x)$, with the initial condition $f(-1) = 3$.

[11] A) $y = \sqrt{-2x+3}$

[5] B) $y = \sqrt[3]{-3x^2+30}$

[4] C) $y = \sqrt[3]{-3x^2+24}$

[1] D) $y = \sqrt{-2x+7}$

[2] E) $y = \sqrt{-3x^2-10}$

$y^2 dy = -2x\,dx$

$\int y^2 dy = \int -2x\,dx$

$\frac{y^3}{3} = \frac{-2x^2}{2} + C$ (-1, 3)

$\frac{(3)^3}{3} = \frac{-2(-1)^2}{2} + C$

$9 = -1 + C$

$10 = C$

$\frac{y^3}{3} = -x^2 + 10$

$\left(\frac{y^3}{3} = -x^2 + 10\right)3$

$y^3 = -3x^2 + 30$

$y = \sqrt[3]{-3x^2+30}$

6.3/6.2 Solving Differential Equations Formative Check-in Name: Period:____

1)

Given the differential equation $\frac{dy}{dx} = -\frac{2x}{y^2}$, find the particular solution, $y = f(x)$, with the initial condition $f(-1) = 3$.

A) $y = \sqrt{-2x+3}$

B) $y = \sqrt[3]{-3x^2+30}$

C) $y = \sqrt[3]{-3x^2+24}$

D) $y = \sqrt{-2x+7}$

E) $y = \sqrt{-3x^2-10}$

2) Given the differential equation $\frac{y'}{3-x} = 6y$, find the particular solution, $y = f(x)$, with the initial condition f(0) = 2

2 A) $y = \sqrt{-\frac{3}{2}x^2 + x + 2}$

2 B) $y = \sqrt{-3x^2 + 36x + 4}$

1 C) $y = \ln|18x - 3x^2| + 2$

4 D) $y = e^{18x-3x^2} + 2$

5 E) $y = 2e^{18x-3x^2}$

$\frac{y'}{3-x} = 6y$

$y' = 6y(3-x)$

$\frac{dy}{dx} = \frac{6y(3-x)}{1}$

$dy = 6y(3-x)dx$

$\frac{dy}{y} = 6(3-x)dx$

$\int \frac{1}{y}dy = \int 18 - 6x\,dx$

$\ln|y| = 18x - \frac{6x^2}{2} + C$

$\ln|y| = 18x - 3x^2 + C$

$e^{\ln|y|} = e^{18x-3x^2+C}$

$|y| = e^{18x-3x^2} \cdot e^C$

$|y| = e^{18x-3x^2} \cdot C$

$|y| = Ce^{18x-3x^2}$

$y = Ce^{18x-3x^2}$ (0,2)

$2 = Ce^{18(0)-3(0)^2}$

$2 = Ce^0$

$2 = C$

$y = 2e^{18x-3x^2}$

---

2) Given the differential equation $\frac{y'}{3-x} = 6y$, find the particular solution, $y = f(x)$, with the initial condition f(0) = 2

A) $y = \sqrt{-\frac{3}{2}x^2 + x + 2}$

B) $y = \sqrt{-3x^2 + 36x + 4}$

C) $y = \ln|18x - 3x^2| + 2$

D) $y = e^{18x-3x^2} + 2$

E) $y = 2e^{18x-3x^2}$

6.3/6.2 Differential Equations Formative Check Part 2 Name: _____ Period: ____

1)

Given the differential equation $\frac{dy}{dx} = \frac{2x-1}{y}$, find the particular solution, $y = f(x)$, with the initial condition $f(-3) = 6$.

6.3/6.2 Differential Equations Formative Check Part 2 Name: _____ Period: ____

1)

Given the differential equation $\frac{dy}{dx} = \frac{2x-1}{y}$, find the particular solution, $y = f(x)$, with the initial condition $f(-3) = 6$.

2)

What is the particular solution to the differential equation $\frac{dy}{dx} = x^2 y$ with the initial condition $y(3) = e$?

2)

What is the particular solution to the differential equation $\frac{dy}{dx} = x^2 y$ with the initial condition $y(3) = e$?

6.3/6.2 Differential Equations Formative Check Part 2 Name: _____ Period: ____ Key

1)

Given the differential equation $\frac{dy}{dx} = \frac{2x-1}{y}$, find the particular solution, $y = f(x)$, with the initial condition $f(-3) = 6$.

6.3/6.2 Differential Equations Formative Check Part 2 Name: _____ Period: ____ Key

1)

Given the differential equation $\frac{dy}{dx} = \frac{2x-1}{y}$, find the particular solution, $y = f(x)$, with the initial condition $f(-3) = 6$.

$y\,dy = 2x - 1\,dx$

$\int y\,dy = \int 2x - 1\,dx$

$\frac{y^2}{2} = \frac{2x^2}{2} - 1x + C$

$\frac{y^2}{2} = x^2 - x + C$ ← plug in (-3, 6)

$\frac{6^2}{2} = (-3)^2 - (-3) + C$

$18 = 9 + 3 + C$

$18 = 12 + C$

$6 = C$

$\frac{y^2}{2} = x^2 - x + \underline{C}$

$2\left(\frac{y^2}{2} = x^2 - x + 6\right)$

$y^2 = 2x^2 - 2x + 12$

$\boxed{y = \sqrt{2x^2 - 2x + 12}}$

2)

What is the particular solution to the differential equation $\frac{dy}{dx} = x^2y$ with the initial condition $y(3) = e$?

Key

2)

What is the particular solution to the differential equation $\frac{dy}{dx} = x^2y$ with the initial condition $y(3) = e$?

Key

$\frac{dy}{dx} = \frac{x^2y}{1}$

$dy = x^2y\,dx$

$\frac{dy}{y} = x^2dx$

$\int \frac{1}{y}dy = \int x^2dx$

$\ln|y| = \frac{x^3}{3} + C$

$e^{\ln|y|} = e^{x^3/3 + C}$

$|y| = e^{x^3/3} \cdot e^C$

$|y| = e^{x^3/3} \cdot C$

$|y| = Ce^{x^3/3}$

$y = Ce^{x^3/3}$ ← plug in $(3, e)$

$e = Ce^{3^3/3}$

$e = Ce^9$

$\frac{e}{e^9} = C$

$\frac{1}{e^8} = C$

$y = \frac{1}{e^8} \cdot e^{x^3/3}$

$y = e^{-8} \cdot e^{x^3/3}$

$y = e^{x^3/3 - 8}$

6.3/6.2 Solving Differential Equations Mini WS #3 Name: _____ Period:____

1. Given the differential equation, $ww' = t^2 sec^2(2t^3)$, find the particular solution, $w = f(t)$, with the initial condition $w(0) = -4$.

6.3/6.2 Solving Differential Equations Mini WS #3 Name: _____ Period:____

1. Given the differential equation, $ww' = t^2 sec^2(2t^3)$, find the particular solution, $w = f(t)$, with the initial condition $w(0) = -4$.

2. Given the differential equation, $y'xlnx - y = 0$, find the particular solution , $y = f(x)$, with the initial condition $f(e) = e$

2. Given the differential equation, $y'xlnx - y = 0$, find the particular solution , $y = f(x)$, with the initial condition $f(e) = e$

6.3/6.2 Solving Differential Equations Mini WS #3 Name: Key Period:____

1. Given the differential equation, $ww' = t^2sec^2(2t^3)$, find the particular solution, $w = f(t)$, with the initial condition $w(0) = -4$.

$$\frac{w \cdot dw}{dt} = \frac{t^2sec^2(2t^3)}{1}$$

$$wdw = t^2sec^2(2t^3)dt$$

$$\int wdw = \int t^2sec^2(2t^3)dt$$

$u = 2t^3 \quad dt = \frac{du}{6t^2}$

$\frac{du}{dt} = 6t^2$

$$= \int t^2 \cdot sec^2u \cdot \frac{du}{6t^2}$$

$$\int wdw = \frac{1}{6}\int sec^2u\,du$$

$$\frac{w^2}{2} = \frac{1}{6}tanu + C$$

$$\frac{w^2}{2} = \frac{1}{6}tan(2t^3) + C$$

solve for C, plug in (0, -4)

$$\frac{(-4)^2}{2} = \frac{1}{6}tan(2(0)^3) + C$$

$$8 = 0 + C$$

$$8 = C$$

$$\left(\frac{w^2}{2} = \frac{1}{6}tan(2t^3) + 8\right)2$$

$$w^2 = \frac{2}{6}tan(2t^3) + 16$$

$$w = -\sqrt{\frac{1}{3}tan(2t^3) + 16}$$

6.3/6.2 Solving Differential Equations Mini WS #3 Name: _____ Period:____

1. Given the differential equation, $ww' = t^2sec^2(2t^3)$, find the particular solution, $w = f(t)$, with the initial condition $w(0) = -4$.

2. Given the differential equation, $y'xlnx - y = 0$, find the particular solution, $y = f(x)$, with the initial condition $f(e) = e$

Key

$$\frac{dy}{dx}\frac{xlnx}{1} = \frac{y}{1}$$

$$xlnx\,dy = y\,dx$$

$$\frac{dy}{y} = \frac{dx}{xlnx}$$

$$\int \frac{dy}{y} = \int \frac{dx}{xlnx}$$

$u = lnx \quad dx = x\,du$

$\frac{du}{dx} = \frac{1}{x}$

$$\int \frac{dy}{y} = \int \frac{x\,du}{x \cdot u} \rightarrow \int \frac{1}{u}\,du$$

$$ln|y| = ln|u| + c$$

$$ln|y| = ln|lnx| + c$$

$$e^{ln|y|} = e^{ln|lnx| + c}$$

$$|y| = e^{ln|lnx|} \cdot e^{c}$$

$$|y| = |lnx| \cdot C$$

$$y = C\,lnx$$

plug in (e, e)

$$e = C\,lne$$

$$e = C(1)$$

$$e = C$$

$$\boxed{y = e\,lnx}$$

2. Given the differential equation, $y'xlnx - y = 0$, find the particular solution, $y = f(x)$, with the initial condition $f(e) = e$