Unit 6 Test Review Packet: MC Part 1 KEY

1) $\frac{dy}{dt} = -2y$

C $\frac{1}{y}dy = -2\,dt$

$\ln|y| = -2t + C$

$\ln|1| = -2(0) + C$

$0 = 0 + C$

$C = 0$

$\ln|y| = -2t$

$\ln\frac{1}{2} = -2t$

$\frac{\ln\frac{1}{2}}{-2} = t$

$-\frac{1}{2}\ln\frac{1}{2} = t$

$\frac{1}{2}\ln\left(\frac{1}{2}\right)^{-1} = t$

$\frac{1}{2}\ln 2 = t$

$t = \frac{\ln 2}{2}$

2) $3x^2y = \frac{dy}{dx}$

A $3x^2dx = \frac{1}{y}dy$

$\ln|y| = x^3 + C$

$y = e^{x^3+C}$

$y = Ce^{x^3}$

$8 = Ce^0$

$C = 8$

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

3) $\frac{dy}{dx} = y\cdot\sec^2 x$

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

$\ln|y| = \tan x + C$

$y = e^{\tan x + C}$

$y = Ce^{\tan x}$

$5 = Ce^{\tan 0}$

$5 = C$

$y = 5e^{\tan x}$

4) $\int y\,dy = \int x\,dx$

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

$y^2 = x^2 + 2C$

$y^2 - x^2 = 2C$

$-(y^2 + x^2) = -2C$

$x^2 - y^2 = C$

5) $\frac{dy}{dx} = 2y^2$

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

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

$1 = 2(1) + C$

$1 = 2 + C$

$C = -1$

$-\frac{1}{y} = 2x - 1$

$-1 = y(2x-1)$

$y = \frac{-1}{2x-1}$ $\quad y = \frac{-1}{2(2)-1}$

$y = \frac{-1}{3}$

6) $\frac{dy}{dx} = \frac{y}{2\sqrt{x}}$

E

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

$\frac{1}{2}\int x^{-1/2}\,dx$

$\ln|y| = \frac{1}{2} \cdot 2x^{1/2} + C$

$\ln|y| = x^{1/2} + C$

$\ln 1 = 4^{1/2} + C$

$0 = 2 + C$

$C = -2$

$\ln y = \sqrt{x} - 2$

$y = e^{\sqrt{x}-2}$

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

C

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

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

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

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

8) $\frac{dy}{dx} = e^y$

C

$\int e^{-y}\,dy = \int dx$

$-e^{-y} = x + C$

$-e^0 = 1 + C$

$-1 = 1 + C$

$C = -2$

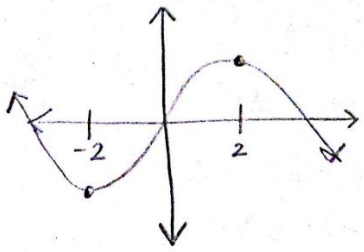
$-e^{-y} = x - 2$

$e^{-y} = -x + 2$

$\ln e^{-y} = \ln(-x+2)$

$-y = \ln(-x+2)$ $\quad y = -\ln(-x+2)$

9) None



10) $\frac{dy}{dx} = (1 + \ln x)y$

E

(omit)

$\int \frac{1}{y}\,dy = \int (1 + \ln x)\,dx$

$\ln|y| = x + (x\ln x - x) + C$

$\ln 1 = 1 + 1\ln 1 - 1 + C$

$0 = 0 + C$

$C = 0$

$\ln|y| = x\ln x$

$y = e^{x\ln x}$

11) $\frac{dy}{dt} = ky$

B

$\frac{1}{y}\,dy = k\,dt$

$\ln|y| = kt + C$

$y = e^{kt+C}$

$y = Ce^{kt}$

12) $\frac{dy}{dx} = \frac{x}{\sqrt{9+x^2}}$

B $\int dy = \int \frac{x}{\sqrt{9+x^2}} dx$ $u = 9+x^2$, $du = 2x\,dx$, $\frac{1}{2}du = x\,dx$

$y = \frac{1}{2}\int u^{-1/2} du$

$y = \frac{1}{2} \cdot 2u^{1/2} + C$

$y = \sqrt{9+x^2} + C$

$5 = \sqrt{9+4^2} + C$

$5 = \sqrt{25} + C$

$C = 0$

$y = \sqrt{9+x^2}$

13) $\frac{dy}{dx} = \sin x \cdot \cos^2 x$

B $\int dy = \int \sin x \cdot \cos^2 x\, dx$ $u = \cos x$, $du = -\sin x\,dx$, $-du = \sin x\,dx$

$y = -\int u^2 du$

$y = -\frac{\cos^3 x}{3} + C$

$0 = -\frac{(\cos \frac{\pi}{2})^3}{3} + C$

$0 = 0 + C$

$C = 0$

$y = -\frac{\cos^3 x}{3}$

$y = -\frac{(\cos 0)^3}{3}$

$y = -\frac{1}{3}$

14)

C slope at $(2,-2)$ and $(-2,2)$ are both 0