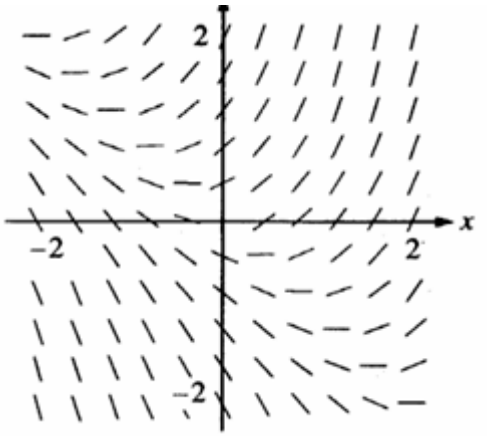
Name KEY Date_____ Period_____

Take Home TEST: 6.4 – 7.1 All integration techniques and Differential Equations

NO CALCULATOR PERMITTED

Part I: Multiple Choice:

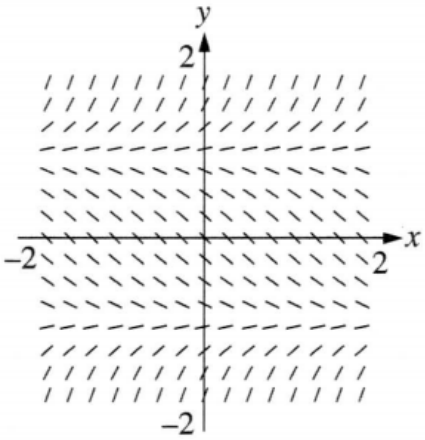
C 1. (no work needed) Shown at right is a slope field for which of the following differential equations?



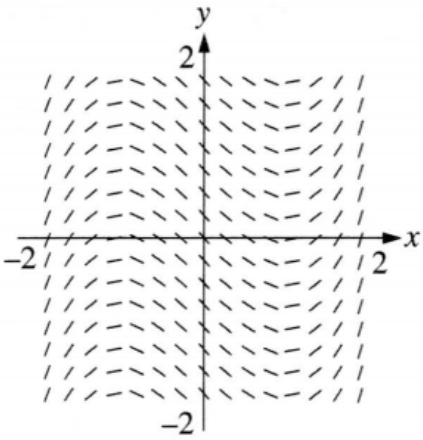
(A) $\frac{dy}{dx} = 1 + x$ (B) $\frac{dy}{dx} = x^2$ (C) $\frac{dy}{dx} = x + y$ (D) $\frac{dy}{dx} = \frac{x}{y}$ (E) $\frac{dy}{dx} = \ln y$

A 2. (no work needed) Which of the following could be the slope field for the differential equation $\frac{dy}{dx} = y^2 - 1$?

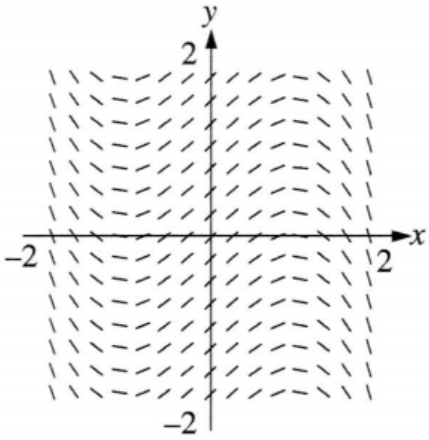
(A)



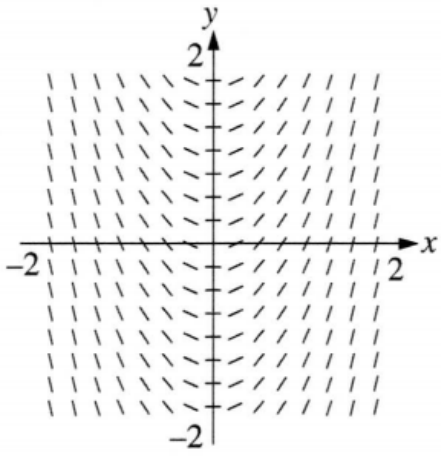
(B)



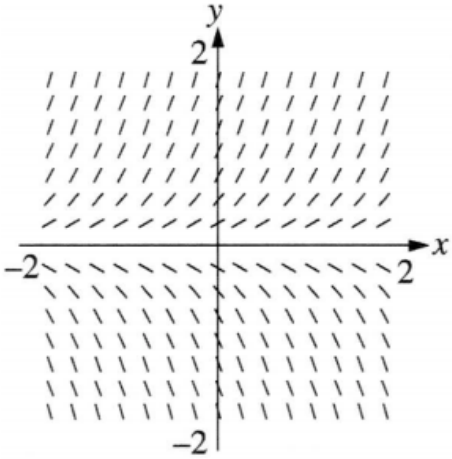
(C)



(D)



(E)



Part II: Short Answer—Evaluate the following indefinite integrals. **Simplify your coefficients! Don't forget $+C$. Do all work in the space provided below each problem.**

3. $\int \frac{9}{\sqrt{25-4x^2}}dx =$

$a=5$ $u=2x$

$(9)(\frac{1}{2})\arcsin(\frac{2x}{5})+C$

$\frac{9}{2}\arcsin(\frac{2}{5}x)+C$

4. $\int \frac{9x}{\sqrt{25-4x}}dx =$

$u=25-4x$, $du=-4dx$, $dx=-\frac{1}{4}du$, $x=\frac{1}{4}(25-u)$

$(-\frac{1}{4})9(\frac{1}{4})\int(25-u)(u^{-1/2})du$

$-\frac{9}{16}\int[25u^{-1/2}-u^{1/2}]du$

$=-\frac{9}{16}\left[25(2)(25-4x)^{1/2}-(\frac{2}{3})(25-4x)^{3/2}\right]+C$

$=-\frac{9}{16}\left[50(25-4x)^{1/2}-\frac{2}{3}(25-4x)^{3/2}\right]+C$

$=-\frac{450}{16}(25-4x)^{1/2}+\frac{18}{48}(25-4x)^{3/2}+C$

$=-\frac{225}{8}(25-4x)^{1/2}+\frac{3}{8}(25-4x)^{3/2}+C$

$=-28.125\sqrt{25-4x}+0.375\sqrt{(25-4x)^3}+C$

5. $\int \frac{9x}{\sqrt{25-4x^2}}dx =$

$9\int x(25-4x^2)^{-1/2}dx$

$(9)(-\frac{1}{8})(2)(25-4x^2)^{1/2}+C$

$-\frac{18}{8}(25-4x^2)^{1/2}+C$

$-\frac{9}{4}(25-4x^2)^{1/2}+C$

6. $\int 5\sec^2 x\cdot e^{\tan x}dx =$

$5e^{\tan x}+C$

7. $\int 2x^2(2x^3+5)^4 dx =$

$(2)(\frac{1}{6})(\frac{1}{5})(2x^3+5)^5+C$

$\frac{2}{30}(2x^3+5)^5+C$

$\frac{1}{15}(2x^3+5)^5+C$

8. $\int \frac{4}{x\sqrt{(\ln x)^5}}dx =$

$4\int(\frac{1}{x})(\ln x)^{-5/2}dx$

$(4)(-\frac{2}{3})(\ln x)^{-3/2}+C$

$-\frac{8}{3}(\ln x)^{-3/2}+C$

9. $\int 7x\csc(2x^2)dx =$

$-(7)(\frac{1}{4})\ln|\csc(2x^2)+\cot(2x^2)|+C$

$-\frac{7}{4}\ln|\csc(2x^2)+\cot(2x^2)|+C$

10. $\int \frac{4}{x^2-14x+49}dx =$

$4\int\frac{1}{(x-7)^2}dx$

$4\int(x-7)^{-2}dx$

$(4)(-1)(x-7)^{-1}+C$

$\frac{-4}{x-7}+C$

11. $\int \frac{x-7}{x^2-14x+48}dx =$

$\int(x-7)(x^2-14x+48)^{-1}dx$

$\frac{1}{2}\ln|x^2-14x+48|+C$

or $\frac{1}{2}\ln|x-6|+\frac{1}{2}\ln|x-8|+C$

33 checks

Read and Sign to acknowledge the following statement:

I completed this test on my own without any help from others. I am an honest and upright student with impeccable integrity who eschews academic dishonesty, chicanery, corruption, perfidiousness, double-dealing fraudulence, and cunning improbity. I also LOVE math!

X Me

Your Signature