Calculus Honors AB (CHAB) S.Hogan
Chapter 7/8 Review

CALCULATORS ARE PERMITTED—

But all CALCULUS work (integrating, deriving) must be shown by hand. You may use your calculator for simple arithmetic with large quantities and to check your work.

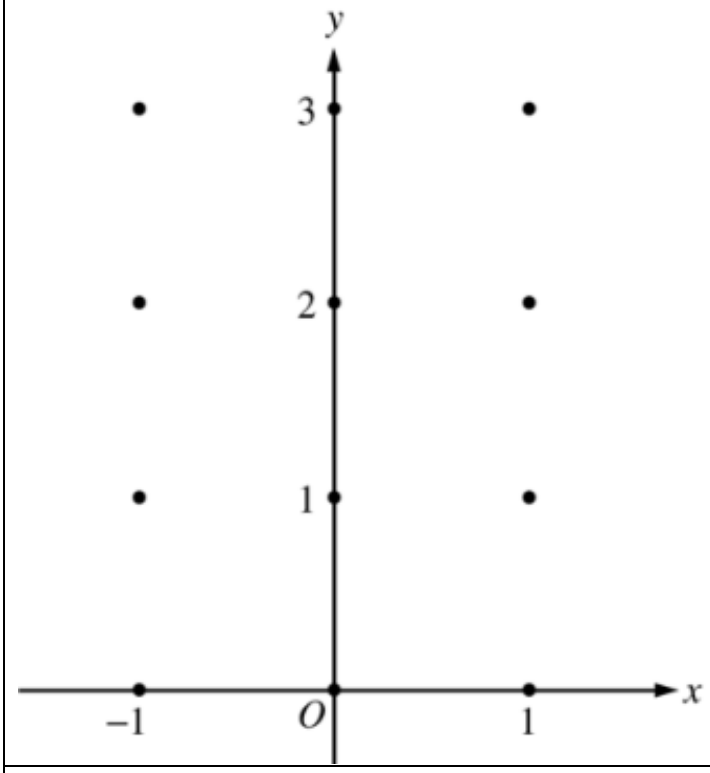
This review is identical in format to the exam. Only the actual values in the questions will vary.

Multiple-Choice Answers: (#1-15) You may write on the actual exam, but only answers recorded HERE will count towards your grade. Please write in capital letters to clearly distinguish between A and D. *(3 points each.)*

Free-Response: (Total 25 points.)
You must show a reasonable amount of work that leads to your answer. Where it is impossible to show work, explain the mental leaps that you made to draw your conclusion.

16. Consider the differential equation $\frac{dy}{dx} = x^4(y-2)$.

A. On the axes provided, sketch a slope field for the given differential equation at the twelve points indicated. **Make a table to find the slopes and SHOW ALL WORK**. *(14 points)*



B. While the slope field in part (a) is drawn at only twelve points, it is defined at every point in the xy-plane. Describe all points in the xy-plane for which the slopes are negative. SHOW ALL WORK. *(3 points)*

C. Find the general solution, y = f(x), to the differential equation. SHOW ALL WORK. *(5 points)*

D. Find the particular solution, y = f(x), to the differential equation with the initial condition f(0) = 0. SHOW ALL WORK. *(3 points.)*

CHAB Name_____

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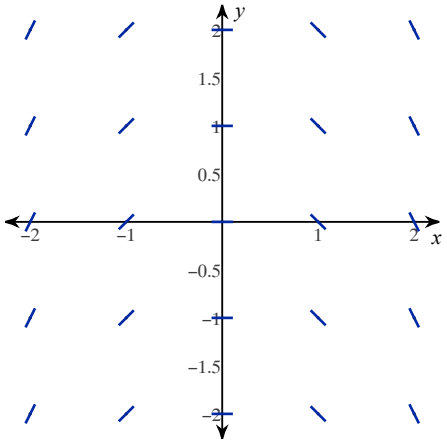
For each problem, find a differential equation that could be represented with the given slope field.

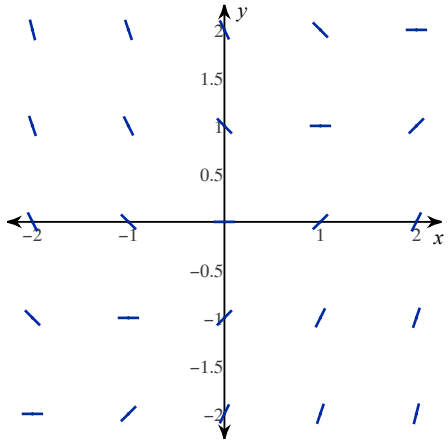
1)



A) $\frac{dy}{dx} = y$ B) $\frac{dy}{dx} = -1$

C) $\frac{dy}{dx} = \frac{1}{y}$ D) $\frac{dy}{dx} = -x$

2)



A) $\frac{dy}{dx} = x - y$ B) $\frac{dy}{dx} = -\frac{x}{y}$

C) $\frac{dy}{dx} = xy$ D) $\frac{dy}{dx} = y - x$

Find the general solution of each differential equation.

3) $\frac{dy}{dx} = 4x - 3$

A) $y = 2x^2 - 3x + C$
B) $y = -x^2 + 3x + C$
C) $y = 2x^2 - 2x + C$
D) $y = x^2 - x + C$

4) $\frac{dy}{dx} = 2\sin x$

A) $y = 2\cos x + C$
B) $y = -3\sin x + C$
C) $y = -2\cos x + C$
D) $y = -3\cos x + C$

For each problem, find the particular solution of the differential equation that satisfies the initial condition.

5) $\frac{dy}{dx} = 2x - 1,\ y(-1) = -1$

A) $y = -x^2 - 2x - 2$
B) $y = x^2 - x - 3$
C) $y = x^2 + 3x - 2$
D) $y = -x^2 + 2x + 3$

6) $\frac{dy}{dx} = -2\sin x,\ y(0) = 3$

A) $y = 2\sin x + 1$
B) $y = \cos x - 1$
C) $y = 2\cos x + 1$
D) $y = 3\cos x$

Find the general solution of each differential equation.

7) $\frac{dy}{dx} = 3e^{x-y}$

A) $\frac{y^3}{3} = \frac{x^2}{2} + C_1$

$y = \sqrt[3]{\frac{3x^2}{2} + C}$

B) $e^y = 3e^x + C$

$y = \ln\left(3e^x + C\right)$

C) $e^y = e^x + C$

$y = \ln\left(e^x + C\right)$

D) $e^y = 2e^x + C$

$y = \ln\left(2e^x + C\right)$

Differentiate each function with respect to *x*.

8) $f(x) = \sin^{-1} -4x^5$

A) $f'(x) = -20x^4 \cos -4x^5$

B) $f'(x) = -\frac{20x^4}{1 - 16x^{10}}$

C) $f'(x) = -\frac{20x^4}{\sqrt{1 + 4x^5}}$

D) $f'(x) = -\frac{20x^4}{\sqrt{1 - 16x^{10}}}$

9) $f(x) = \tan^{-1} -4x^2$

A) $f'(x) = -\frac{8x}{-4x^2 + 1}$

B) $f'(x) = -\frac{8x}{\sqrt{16x^4 + 1}}$

C) $f'(x) = -\frac{8x}{16x^4 + 1}$

D) $f'(x) = -8x \cdot \sec^2 -4x^2$

10) $f(x) = \sec^{-1} 2x^3$

A) $f'(x) = \frac{6x^2}{\left|2x^3\right| \sqrt{4x^6 - 1}}$

B) $f'(x) = \frac{6x^2}{\left|2x^3\right| \left(4x^6 - 1\right)}$

C) $f'(x) = 6x^2 \sec^{-1} 2x^3 \cdot \cot 2x^3$

D) $f'(x) = \frac{6x^2}{\left|2x^3\right| \sqrt{2x^3 - 1}}$

Evaluate each indefinite integral.

11) $\int \frac{10x^4}{\sqrt{16 - 4x^{10}}}\,dx$

A) $\frac{1}{2} \cdot \tan^{-1} \frac{2x^5}{2} + C$

B) $\frac{1}{2} \cdot \sec^{-1} \frac{\left|2x^5\right|}{2} + C$

C) $\sin^{-1} \frac{2x^5}{4} + C$

D) $\frac{1}{5} \cdot \tan^{-1} \frac{2x^5}{5} + C$

12) $\int \frac{10x^4}{1 + 4x^{10}}\,dx$

A) $\sin^{-1} \frac{2x^5}{4} + C$

B) $\frac{1}{4} \cdot \sec^{-1} \frac{\left|2x^5\right|}{4} + C$

C) $\frac{1}{4} \cdot \tan^{-1} \frac{2x^5}{4} + C$

D) $\tan^{-1} 2x^5 + C$

13) $\int \frac{16x^3}{4x^4\sqrt{16x^8 - 1}}\,dx$

A) $\frac{1}{4} \cdot \sec^{-1} \frac{\left|4x^4\right|}{4} + C$

B) $\sec^{-1} \left|4x^4\right| + C$

C) $\sin^{-1} \frac{4x^4}{4} + C$

D) $\frac{1}{3} \cdot \tan^{-1} \frac{4x^4}{3} + C$

14) $\int \frac{2e^{2x}}{\sqrt{4 - e^{4x}}}\,dx$

A) $\tan^{-1} e^{2x} + C$

B) $\sin^{-1} \frac{e^{2x}}{4} + C$

C) $\sin^{-1} \frac{e^{2x}}{2} + C$

D) $\sin^{-1} \frac{e^{2x}}{3} + C$

15) $\int \frac{2e^{2x}}{4 + e^{4x}}\,dx$

A) $\frac{1}{3} \cdot \sec^{-1} \frac{\left|e^{2x}\right|}{3} + C$

B) $\frac{1}{2} \cdot \tan^{-1} \frac{e^{2x}}{2} + C$

C) $\frac{1}{5} \cdot \sec^{-1} \frac{\left|e^{2x}\right|}{5} + C$

D) $\sin^{-1} \frac{e^{2x}}{5} + C$

Answers to Chapter 7/8 Review

1) D
2) A
3) A
4) C
5) B
6) C
7) B
8) D
9) C
10) A
11) C
12) D
13) B
14) C
15) B