CH EN 3353
Homework #1

Assigned 8/25/21. Due 9/1/21.

Note: "math_review.pdf" on Canvas will be helpful

Problem 1. Derivatives
Differentiate. Show all work.

(a) $\frac{d}{dx}(x^{-2.5})$

(b) $\frac{d}{dx}(x^2 \sin 2x + 2x \tan x)$

(c) $\frac{d}{dx}\left(\frac{6\sqrt{x}}{x^5-5}\right)$

(d) $\frac{d}{dx}(\ln(20-x))$

(e) $\frac{d}{dx}(\cos^2(x^4))$

Problem 2. Integrals
Integrate. Show all work.

(a) $\int \sin^2 x \ \cos x \ dx$

(b) $\int x^3 \cos(x^4 + 2)\, dx$

(c) $\int \ln(x)\, dx$

(d) $\int \frac{x^4+x}{x-1}$

Problem 3. Partial derivatives
Show all work.

(a) Given $f(x,y,z) = e^{\wedge}\{x + z\}]ln\{y\}$, find $\frac{\partial f}{\partial x}, \frac{\partial f}{\partial y}, \frac{\partial f}{\partial z}$

(b) Given $f(x,y) = \sin\left(\frac{x}{1+y}\right)$, find $\frac{\partial f}{\partial x}, \frac{\partial f}{\partial y}$

(c) Given $f(x,y) = 6x^3 + x^2y^2 - 7y^3$, find all 2nd partial derivatives

Problem 4. Ordinary differential equations

Show all work.

(a) $\dfrac{dy}{dx} = \dfrac{6x^2}{2y + \cos y}$

(b) $\dfrac{dy}{dx} = x^3 y$

(c) $\dfrac{dy}{dx}(1 + \tan y) = x^2 + 1$

(d) $\dfrac{dy}{dx}(2y + e^{3y}) = x\cos x$, when $y(0) = 0$

Problem 5. Linear algebra

Solve the following systems of simultaneous linear equations.

(a) $x + 3y = 8, 2x - 9 = y$

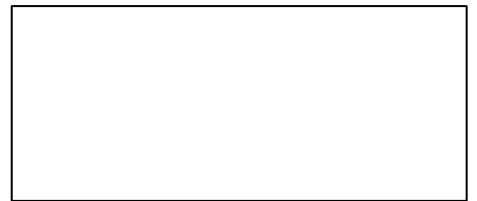(b) $2x + 3y - z = 5, 4x - y - z = -1, x + 4y + z = 12$

Please use these for uploading to Gradescope. Put your final answer in the box provided.
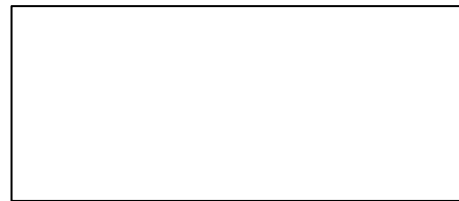
Problem 1
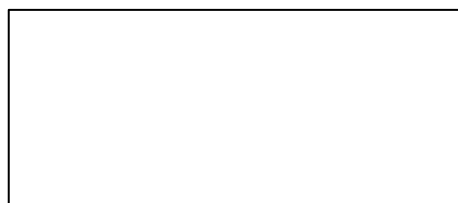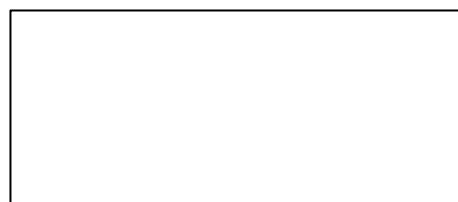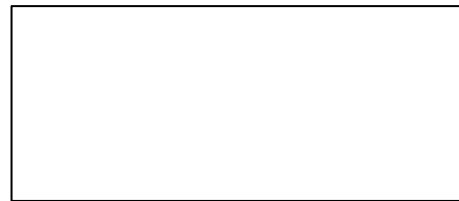(a)

(b)

(c)

(d)

(e)

Problem 2

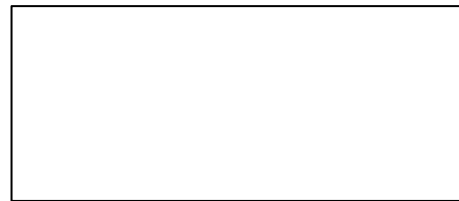(a)

(b)

(c)

(d)

Problem 3

(a)

(b)

(c)

Problem 4

(a)

(b)

(c)

(d)

Problem 5

(a)

(b)