LESSON 25

MA 26100·FALL 2023

DR. HOOD

(Fall 22 Exam 2 #10)

$[0,1] \times [0,2]$

Find the center of mass of the rectangle
$\{(x,y)|0 \le x \le 1, 0 \le y \le 2\}$ where the density function if
given by $\rho(x,y) = xy$.

a) $(1,2)$

b) $(0,0)$

c) $\left(\frac{1}{2}, 1\right)$

d) $\left(\frac{2}{3}, \frac{4}{3}\right)$

e) $\left(\frac{1}{2}, \frac{1}{3}\right)$

$$m = \iint_R \rho \, dA = \int_0^1 \int_0^2 xy \, dy \, dx = \int_0^1 x \left[\frac{y^2}{2}\right]_0^2 dx$$

$$= 2 \left[\frac{x^2}{2}\right]_0^1 = 1$$

$$\bar{x} = \frac{1}{m} \int_0^1 \int_0^2 x \cdot (xy) \, dy \, dx = \frac{2}{1} \int_0^1 x^2 \, dx$$

$$= 2 \left[\frac{x^3}{3}\right]_0^1 = \frac{2}{3}$$

D

ANNOUNCEMENTS

- HW 24 Questions 10 – Typo – removed from assignment

- Dr. Hood must leave promptly after the 4:30pm class to substitute for another class
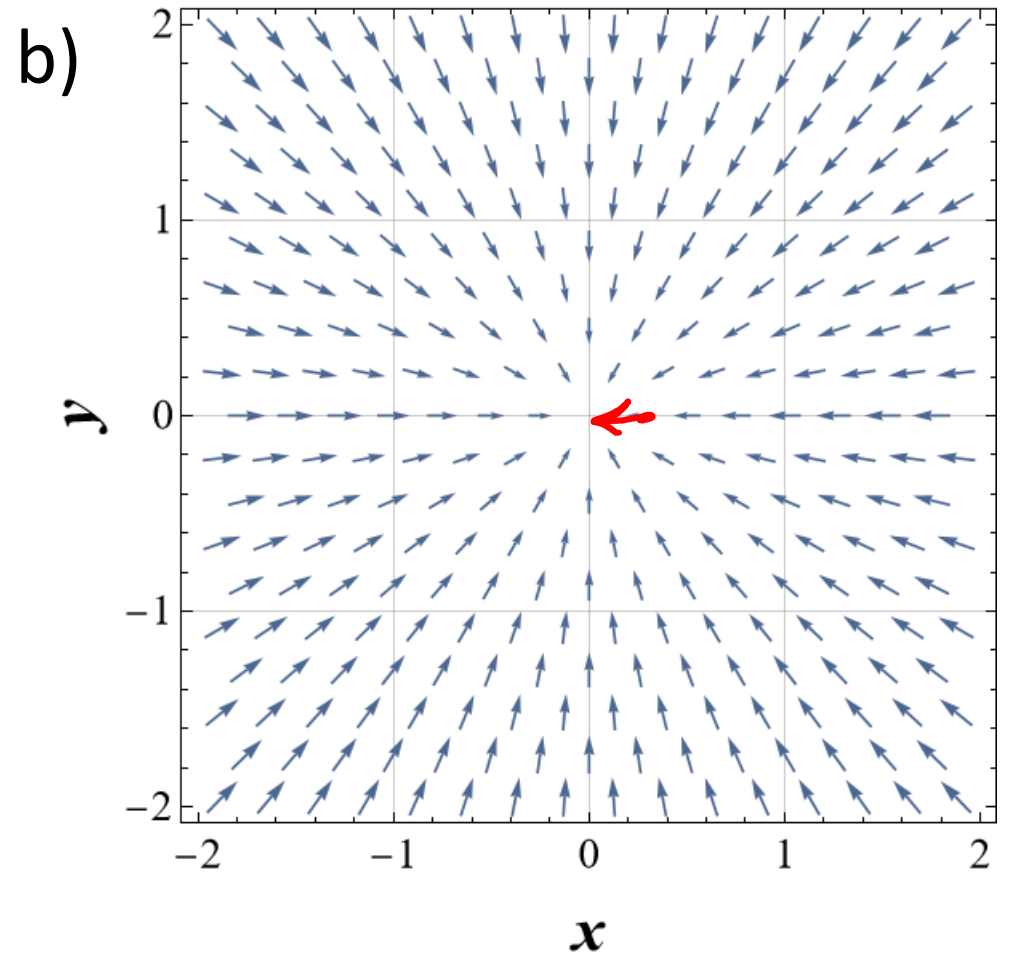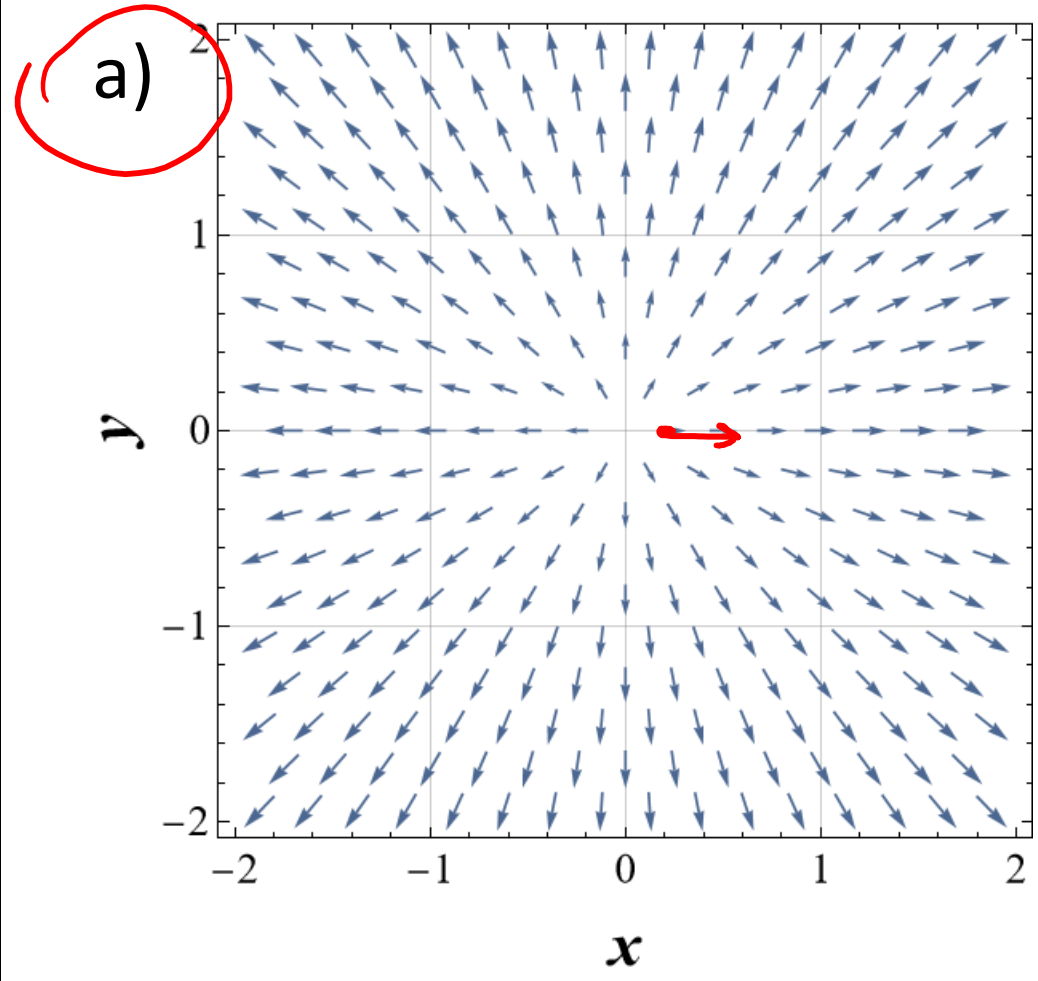
Which of the following plots represents the 2D vector field $\vec{F}(x,y) = \langle x, y \rangle$?

$(x,y) = (1,0)$ $\vec{F}(1,0) = \langle 1,0 \rangle$
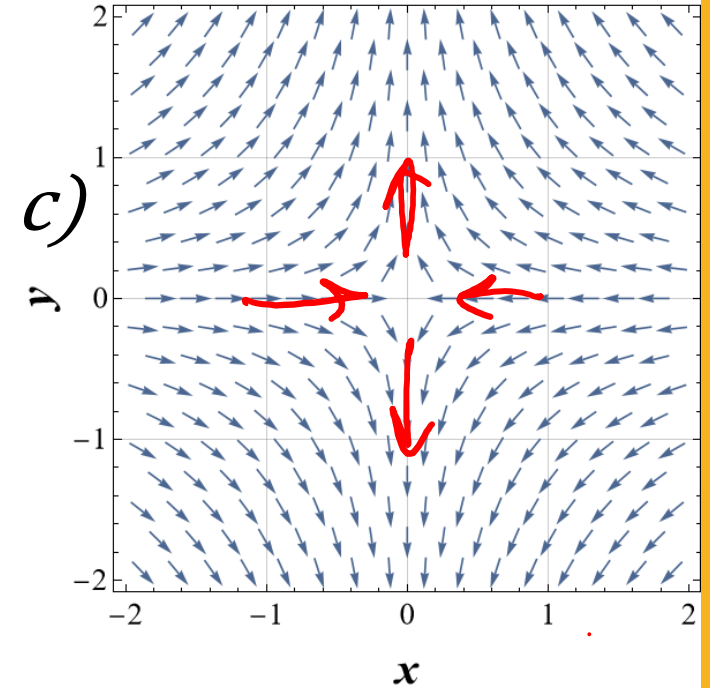
$\langle -x, -y \rangle$

a)

b)

Which of the following is NOT a rotational field?

a) $\vec{F}(x,y) = \langle -2y, 2x \rangle$

b) $\vec{F}(x,y) = \left\langle \dfrac{y}{\sqrt{x^2+y^2}}, \dfrac{-x}{\sqrt{x^2+y^2}} \right\rangle$

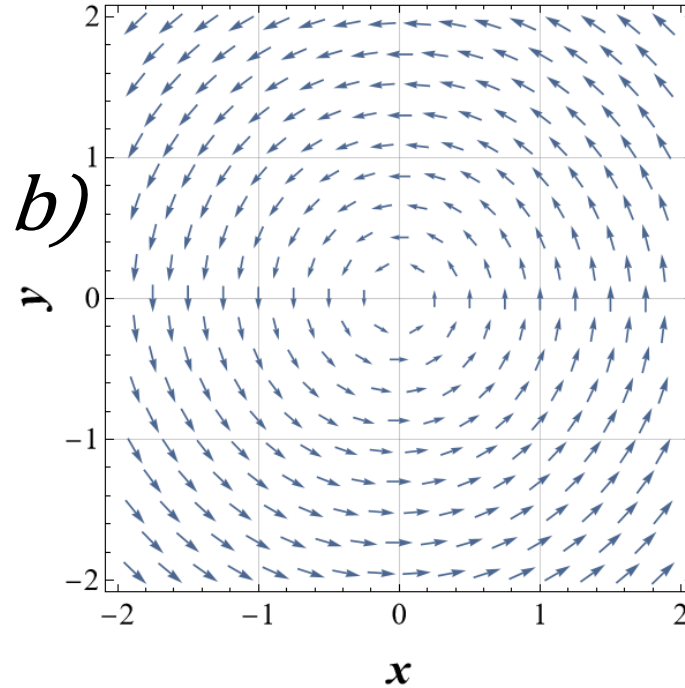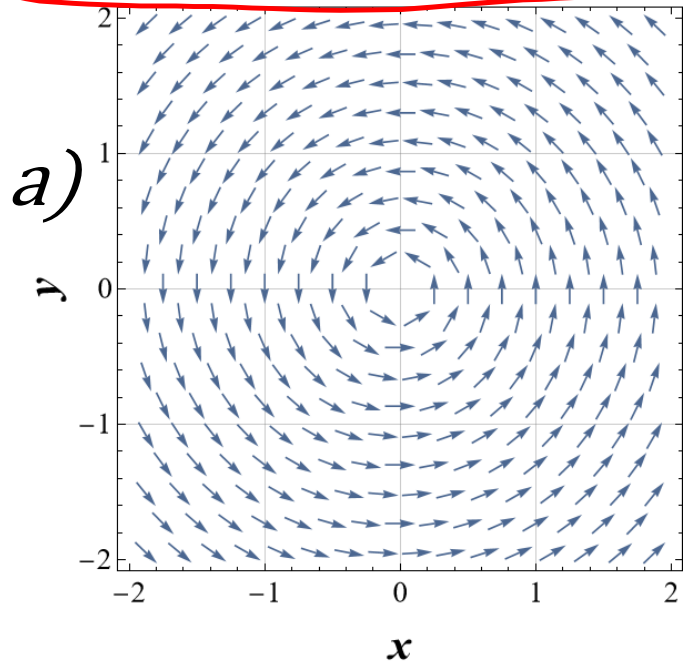c) $\vec{F}(x,y) = \langle -x, y \rangle$

Which of the following is NOT a rotational field?

a) $\vec{F}(x, y) = \langle -2y, 2x \rangle$

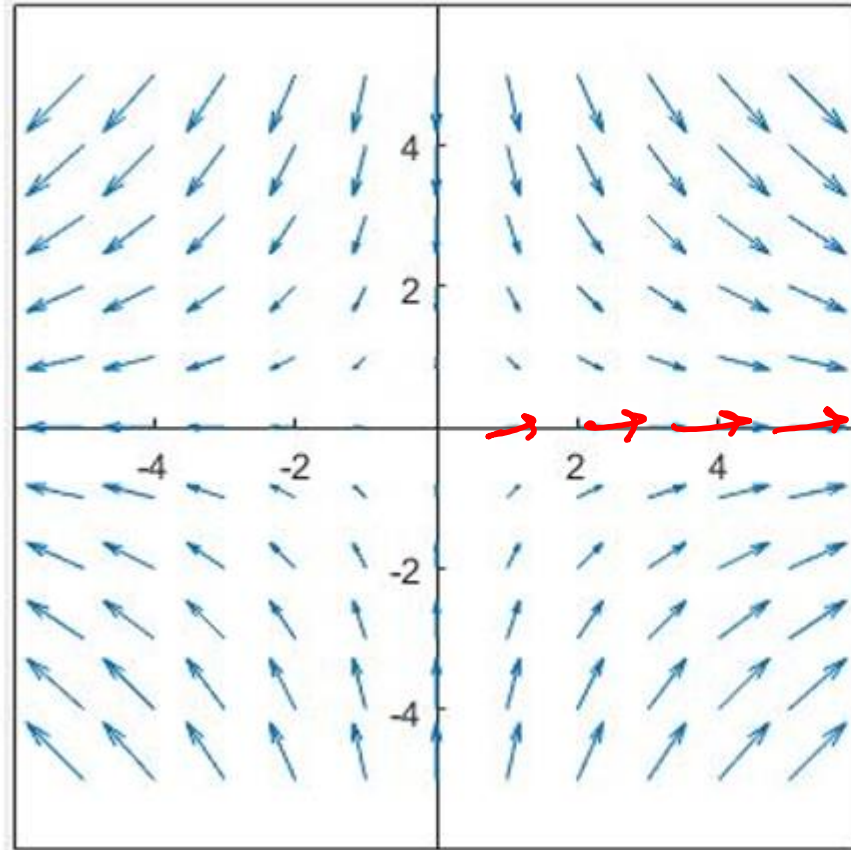b) $\vec{F}(x, y) = \left\langle \dfrac{y}{\sqrt{x^2+y^2}}, \dfrac{-x}{\sqrt{x^2+y^2}} \right\rangle$

c) $\vec{F}(x, y) = \langle -x, y \rangle$

(x, y)	$\vec{F_c}$
$(1, 0)$	$\langle -1, 0 \rangle$
$(0, 1)$	$\langle 0, 1 \rangle$

(Fall 16 Exam 2 #11)

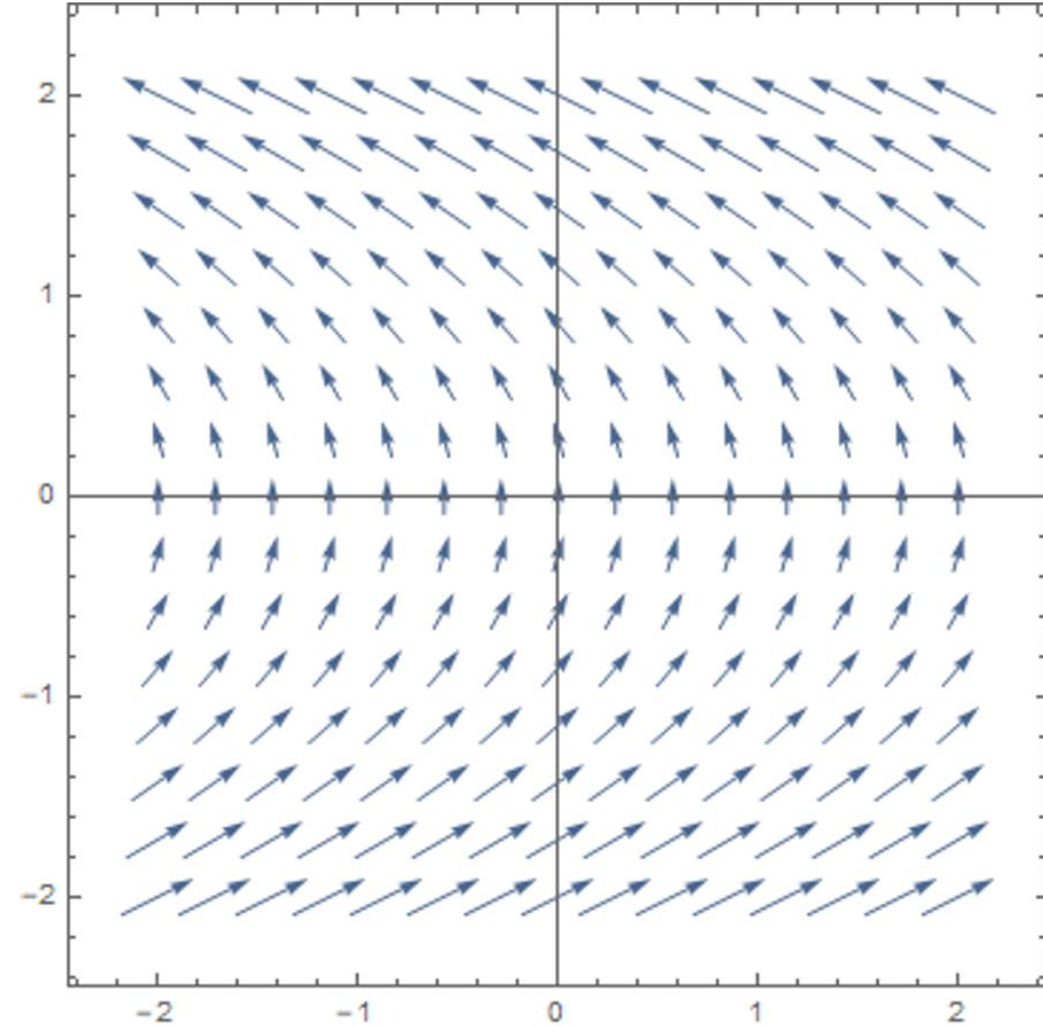11. The graph below is the gradient vector field of which equation?

$$\vec{F} = \nabla f$$

A. $f(x,y) = x^2 + y^2 + 10$ → radial $\langle 2x, 2y \rangle$

B. $f(x,y) = x^2 - y^2 + 10$ $\langle 2x, -2y \rangle$

C. $f(x,y) = e^{y-x}$ $\langle -e^{y-x}, e^{y-x} \rangle$

D. $f(x,y) = e^{x-y}$ $\langle e^{x-y}, -e^{x-y} \rangle$

E. $f(x,y) = \dfrac{y}{x}$ $\langle -\dfrac{y}{x^2}, \dfrac{1}{x} \rangle$

@ $(1,0)$ $\vec{F} = \langle f(x), 0 \rangle$

4. Which vector field corresponds to the one pictured here?

A. $\vec{F}(x,y) = \langle 1, -y \rangle$

B. $\vec{F}(x,y) = \langle -x, y \rangle$

C. $\vec{F}(x,y) = \langle -y, x \rangle$

D. $\vec{F}(x,y) = \langle 1, y \rangle$

E. $\vec{F}(x,y) = \langle y, 1 \rangle$

F. $\vec{F}(x,y) = \langle -y, 1 \rangle$

POLL 4

MUDDIEST POINT

What was the muddiest point from today's lecture?

a) Plotting a vector field

b) Radial field

c) Rotational field

d) Gradient field

e) None – understood everything today