

This practice is a warm up for you to review knowledge you should know before math 234. It is great if you already know them, otherwise do not hesitate to ask or seek after help.

Problem 1 : Vector

$$1. 2 \begin{pmatrix} 3 \\ 4 \end{pmatrix} - 2 \begin{pmatrix} 1 \\ -1 \end{pmatrix} \quad \begin{pmatrix} 4 \\ 10 \end{pmatrix}$$

$$2. \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix} \cdot \begin{pmatrix} -3 \\ 1 \\ 2 \end{pmatrix} \quad 5$$

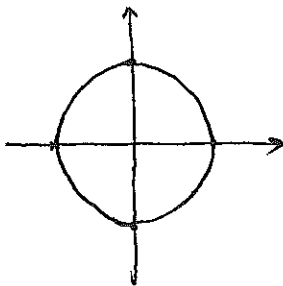
$$3. \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix} \times \begin{pmatrix} -3 \\ 1 \\ 2 \end{pmatrix} \quad \begin{pmatrix} 1 \\ -11 \\ 7 \end{pmatrix}$$

$$4. \left\| \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix} \right\| \quad \sqrt{14}$$

Problem 2: Basic Geometry

1. What is the shape of points satisfying $x^2 + y^2 = 1$? Could you draw it?
2. What is the shape of points satisfying $y = 2x + 1$? Could you draw it? Is the point $(2, 3)$ on your drawing? What about $(1, 3)$?
3. What is the equation for the line crossing both $(1, 7)$ and $(0, 4)$?

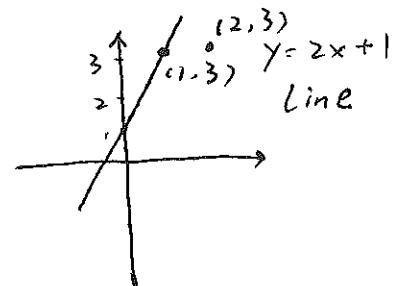
1.



Circle $r = 1$

origin: $(0, 0)$

2.



$$3. \text{ slope : } \frac{7-4}{1-0} = 3$$

$$y = 3x + b \quad \text{plug in } (0, 4)$$

$$4 = b \quad \Rightarrow \quad y = 3x + 4$$

Problem 3: Trig Identity

1. $\sin^2 \theta + \cos^2 \theta = ?$ 1
2. $\sin(2\theta) = ?$ $2 \sin \theta \cos \theta$
3. $\cos(2\theta) = ?$ $2 \cos^2 \theta - 1$

Problem 4: Basic Derivative and Integral

1. Compute the derivative of the following function;
2. remind yourself of integration techniques: integral by parts and substitution.

1. x^{100} ; $100 \cdot x^{99}$
2. $\sin x$; $\cos x$; $-\sin x$
3. e^x ; $\ln x$; e^x ; $\frac{1}{x}$
4. $\frac{1}{x}$; $-\frac{1}{x^2}$
5. e^{x^2+1} ; $e^{x^2+1} \cdot (2x)$