Hw 2

Math 321

The problems with $*$ are for the ones who like math.

1 Exercises in 1.4

#1 #2 #4(Use $\sum$ notation) #5
Extra problems for this section
a. Repeat the proof of $Cauchy - Schwarz$ property for dot-product in $\mathbb{R}^n$ and write out the component form.
b. Find the angle between $(1, 2, 6, 7)$ and $(2, 5, 9, 1)$ in $\mathbb{R}^4$.
c. Define the dot product(inner product) of real valued continuous functions f, g on $[0, 2\pi]$ as

$$\int_0^{2\pi} f(x)g(x)dx$$

Then prove the functions in $\{\cos nx, \sin nx\}$ are orthogonal to each other. (This is the basic things for Fourier series). Given an $f(x)$, find the component of f corresponding to $\cos 3x$.
d. Assume we have 5 quizzes this semester and your scores form a '5-tuplets'
$\vec{x} = (x_1, \ldots, x_5)$. I define your average quiz score to be $\overline{x} = \frac{1}{5^{1/p}}||\vec{x}||_p$ where $||\cdot||_p$ is the p-norm. Consider that your scores are $(8, 9, 7, 5, 10)$ and $p = 1, 2, \infty$. Calculate each average score corresponding to each p, which p would you like me to use? Why?

2 Exercises in 1.5

#1 #2 #6 #8
Extra exercise:
a. $\vec{a} = (1, 2, 3), \vec{b} = (4, 3, 1)$. Calculate $\vec{a} \times \vec{b}$ and the angle between them using dot product and cross product both.

(*)#3 in 1.5.