

## 1 Problem 2

Exercise 2.3 on p. 42

Matlab Solution in file Problem2.m

**Solution:**  $\frac{-1}{\sqrt{10}*\sqrt{14}}$

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$$V1 = \langle 1, -3, 0 \rangle$$

$$V2 = \langle 2, 1, 3 \rangle$$

$$\cos(\theta) = \frac{V1 \cdot V2}{\sqrt{1^2 + (-3)^2 + 0^2} \sqrt{2^2 + 1^2 + 3^2}}$$

$$1. \quad \cos(\theta) = \frac{V1 \cdot V2}{\sqrt{1^2 + (-3)^2 + 0^2} \sqrt{2^2 + 1^2 + 3^2}}$$

$$2. \quad V1 \cdot V2 = (1 * 2) + (1 * -3) + (0 * 3) = -1$$

$$3. \quad \sqrt{1^2 + (-3)^2 + 0^2} = \sqrt{1 + 9} = \sqrt{10}$$

$$4. \quad \sqrt{2^2 + 1^2 + 3^2} = \sqrt{4 + 1 + 9} = \sqrt{14}$$

$$5. \quad \cos(\theta) = \frac{V1 \cdot V2}{\sqrt{1^2 + (-3)^2 + 0^2} \sqrt{2^2 + 1^2 + 3^2}} = \frac{-1}{\sqrt{10} \sqrt{14}}$$

$$\cos(\theta) = \frac{V1 \cdot V2}{\sqrt{1^2 + (-3)^2 + 0^2} \sqrt{2^2 + 1^2 + 3^2}} = \frac{-1}{\sqrt{10} \sqrt{14}}$$

Last problem, Power-reduction formula

## 2 Problem 3

Compute the Jacobian

$$x = u - v + w$$

$$y = u^2 - v^2 - w^2$$

$$z = u^3 + v$$

$$Jacobian(u, v, w) =$$

$$\begin{pmatrix} 1 & -1 & 1 \\ 2u & -2v & -2w \\ 3u^2 & 1 & 0 \end{pmatrix}$$

### 3 Problem 4

Exercise 3.4 on pg. 76

Matlab Solution in file Problem4.m

$$M1 =$$

$$\begin{pmatrix} 2 & -1 & 1 & 0 \\ 1 & 3 & 1 & -1 \\ -2 & 1 & 0 & 1 \end{pmatrix}$$

$$M2 =$$

$$\begin{pmatrix} 1 & 2 \\ -2 & 0 \\ 2 & -1 \\ 1 & 1 \end{pmatrix}$$

$$M1 \cdot M2 =$$

$$\begin{pmatrix} (2 * 1) + (-1 * -2) + (1 * 2) + (0 * 1) & (2 * 2) + (-1 * 0) + (1 * -1) + (0 * 1) \\ (1 * 1) + (3 * -2) + (1 * 2) + (-1 * 1) & (1 * 2) + (3 * 0) + (1 * -1) + (-1 * 1) \\ (-2 * 1) + (1 * -2) + (0 * 2) + (1 * 1) & (-2 * 2) + (1 * 0) + (0 * -1) + (1 * 1) \end{pmatrix}$$

$$=$$

$$\begin{pmatrix} 6 & 3 \\ -4 & 0 \\ -3 & -3 \end{pmatrix}$$

## 4 Problem 5

The textbook, Assignment 3.1 on pp. 78 - 79

Matlab Solutions in files evaluate.m and evaluate2.m

## 5 Problem 6

Let  $z = 5 + 3i$  and  $w = 2 - 4i$

(a)  $\bar{w} = 2 + 4i$

(b)  $z + w = 7 - i$

$$5 + 2 = 7$$

$$3i + -4i = -i$$

$$z + w = 7 - i$$

(c)  $z - w = 3 + 7i$

$$5 - 2 = 3$$

$$3i - (-4i) = 7i$$

$$z - w = 3 + 7i$$

(d)  $zw = 22 - 14i$

$$(5 + 3i)(2 - 4i) =$$

$$10 - 20i + 6i - 12i^2 =$$

$$10 - 14i + 12 =$$

$$22 - 14i$$

(e)  $z/w = \frac{1}{10} + \frac{13i}{10}$

$$\frac{5+3i}{2-4i} =$$

$$\frac{(5+3i)(2+4i)}{(2-4i)(2+4i)} =$$

$$\frac{10+6i+20i+12i^2}{4-8i+8i-16i^2} =$$

$$\frac{10+26i-12}{20} =$$

$$\frac{-2+26i}{20} =$$

$$\frac{-1}{10} + \frac{13i}{10}$$

## 6 Problem 7