MATLAB 10.2 and 10.3

**1)**

u = [1;2]

u =

1

2

w = [3;4]

w =

3

4

p = (dot(u,w)/norm(w)^2)\*w

p =

1.3200

1.7600

norm(p)

ans =

2.2000

norm((1/2.2)\*p)

ans =

1.0000

s = u-p

s =

-0.3200

0.2400

k = 1/2.2

**3)**

w = [3;4]

w =

3

4

u = [4;-3]

u =

4

-3

p = (dot(u,w)/norm(w)^2)\*w

p =

0

0

Since the vectors are orthogonal, there is no projection on the vector.

**4)**

w1 = [1;2;0]

w1 =

1

2

0

w2 = [2;-1;3]

w2 =

2

-1

3

u = [1;4;1]

u =

1

4

1

p1 = (dot(u,w1)/norm(w1)^2)\*w1

p1 =

1.8000

3.6000

0

p2 = (dot(u,w2)/norm(w2)^2)\*w2

p2 =

0.1429

-0.0714

0.2143

p = p1+p2

p =

1.9429

3.5286

0.2143

s = u - p

s =

-0.9429

0.4714

0.7857

**6)**

w1 = [sqrt(2)/2; 0; sqrt(2)/2]

w1 =

0.7071

0

0.7071

w2 = [-sqrt(2)/2; 0; sqrt(2)/2]

w2 =

-0.7071

0

0.7071

dot(w1,w2)

ans =

0

norm(w1)

ans =

1.0000

norm(w2)

ans =

1.0000

u = [4;2;1]

u =

4

2

1

p1 = (dot(u,w1)/norm(w1)^2)\*w1

p1 =

2.5000

0

2.5000

p2 = (dot(u,w2)/norm(w2)^2)\*w2

p2 =

1.5000

0

-1.5000

p = p1+p2

p =

4.0000

0

1.0000

**7)**

w1 = [sqrt(3)/3; sqrt(3)/3; sqrt(3)/3]

w1 =

0.5774

0.5774

0.5774

w2

w2 =

-0.7071

0

0.7071

dot(w1,w2)

ans =

0

norm(w1)

ans =

1.0000

norm(w2)

ans =

1.0000

p1 = (dot(u,w1)/norm(w1)^2)\*w1

p1 =

2.3333

2.3333

2.3333

p2 = (dot(u,w2)/norm(w2)^2)\*w2

p2 =

1.5000

0

-1.5000

p = p1+p2

p =

3.8333

2.3333

0.8333

**10.3**

**1)**

S = [1 1 1; 2 0 0; 0 0 1]

S =

1 1 1

2 0 0

0 0 1

gschmidt(S)

ans =

0.4472 0.8944 0

0.8944 -0.4472 -0.0000

0 0 1.0000

x = [1;2;3]

x =

1

2

3

ans \* x

ans =

2.2361

-0.0000

3.0000

**2)**

S = [-1 2 0 1; 2 1 1 1; 0 1 0 0; 1 0 1 1]

S =

-1 2 0 1

2 1 1 1

0 1 0 0

1 0 1 1

gschmidt(S)

ans =

-0.4082 0.8165 0.2887 0.2887

0.8165 0.4082 -0.2887 0.2887

0 0.4082 -0.2887 -0.8660

0.4082 0 0.8660 -0.2887

x = [4 0 2 1]

x =

4 0 2 1

x = x'

x =

4

0

2

1

ans \* x

ans =

-0.7670

2.9773

-1.4434

3.0764

**7)**

v1 = [3;1;2;0]

v1 =

3

1

2

0

v2 = [1;-1;-1;1]

v2 =

1

-1

-1

1

v3 = [0; -2; 1; -1]

v3 =

0

-2

1

-1

A = [v1 v2 v3 eye(4)]

A =

3 1 0 1 0 0 0

1 -1 -2 0 1 0 0

2 -1 1 0 0 1 0

0 1 -1 0 0 0 1

rref(A)

ans =

1.0000 0 0 0 0 0.5000 0.5000

0 1.0000 0 0 -0.3333 0.1667 0.8333

0 0 1.0000 0 -0.3333 0.1667 -0.1667

0 0 0 1.0000 0.3333 -1.6667 -2.3333

S = A(:,1:4)

S =

3 1 0 1

1 -1 -2 0

2 -1 1 0

0 1 -1 0

T = gschmidt(S)

T =

0.8018 0.5000 0 0.3273

0.2673 -0.5000 -0.8165 0.1091

0.5345 -0.5000 0.4082 -0.5455

0 0.5000 -0.4082 -0.7638

A = [v1 v2 eye(4)]

A =

3 1 1 0 0 0

1 -1 0 1 0 0

2 -1 0 0 1 0

0 1 0 0 0 1

rref(A)

ans =

1.0000 0 0 0 0.5000 0.5000

0 1.0000 0 0 0 1.0000

0 0 1.0000 0 -1.5000 -2.5000

0 0 0 1.0000 -0.5000 0.5000

S = A(:,1:4)

S =

3 1 1 0

1 -1 0 1

2 -1 0 0

0 1 0 0

T = gschmidt(S)

T =

0.8018 0.5000 0.3273 -0.0000

0.2673 -0.5000 0.1091 0.8165

0.5345 -0.5000 -0.5455 -0.4082

0 0.5000 -0.7638 0.4082