|  |  |
| --- | --- |
| x=1+t; y = -3t; z = -3+t | **Find the parametric equations of the line passing through A(1; 0; -3) and parallel to the line with parametric equations x = -1+t; y = 2-3t; z = 5+t.** |
| [\frac{\sqrt6}{2}](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%5Cfrac%7B%5Csqrt6%7D%7B2%7D) | **If v= (3, 3, 6) and u = (2, -1, 1), then the length of the projection of u along v is:** |
| 2/3 | **Let Q be the point on the plane x+y+z=1 that is closet to P(1,0,1). Find the first coordinate of Q.** |
| [\sqrt{10}](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%5Csqrt%7B10%7D) | **Find the area of the triangle with vertices A(1, 2, 1); B(3; 2, 1), C(0, 5, 2).** |
| [\sqrt{33}](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%5Csqrt%7B33%7D) | **Let u = (1; 1; 1); v = (0; 1; 1) and w = (1; 0; 1). Find the length of x = (3u + v)****[[\times](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%5Ctimes)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%5Ctimes" \o "TeX)w.** |
| (1/5)[x+2y; -2x-4y] | **Let T be projection on the line y = 2x followed by reflection in the X axis. Find T[x y].** |
| 2 | **Let u = (3, 3, 6), v = (4, 4, 3), w = (-6, 3, 3) and x = (41, 5, 12). We can write  x = au + bv + cw,  where a, b, c are numbers. Find b.** |
| (i) | **Which of the following are subspaces of R2 ?  (i) {(x, y)| x+2y=0}  (ii) {(x, y)| x+y2= 0}** |
| 2 | **Find the dimension of the subspace  U={[a+3c, b, a+3c] | a, b, c in R}** |
| 2 | **Find the dimension of the subspace U = span{[1, 2], [2, -1], [0, 4], [1, -5]}.** |
| None of the other choices is correct | **Which of the following sets are linearly independent?  (i) {[1, 1, 1], [1, 0, 1], [-1, 1, -1]}  (ii) {[1, 2], [3, 4], [-1, -1]}  (iii) {[1, 2, 1], [1, 1, 1], [-1, 0, 0], [0, 0, 1]}** |
| [rank(A)=2](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=rank%28A%29%3D2)and [\dim(null(A))=2](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%5Cdim%28null%28A%29%29%3D2) | **Let****[[A=\begin{bmatrix} 1&-2& 1& 1\\-2& 4& 3& -2\end{bmatrix}](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=A%3D%5Cbegin%7Bbmatrix%7D%201%26-2%26%201%26%201%5C%5C-2%26%204%26%203%26%20-2%5Cend%7Bbmatrix%7D)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=A%3D%5Cbegin%7Bbmatrix%7D%201%26-2%26%201%26%201%5C%5C-2%26%204%26%203%26%20-2%5Cend%7Bbmatrix%7D" \o "TeX). Find rank(A) and dim(null(A).** |
| dim(Im(A)) = 2, dim(Null(A)) = 7 | **If A is a 5 × 9 matrix that has rank 2, find dim(Im(A)), dim(Null(A))** |
| (2, 0, -2) | **Let P(1,2,1), Q(1,0,-1), R(2,2,0) be the vertices of a parallelogram with adjacent sides PQ and PR. Find the other vertex S.** |
| : [\frac{2}{5}](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%5Cfrac%7B2%7D%7B5%7D) | **Triangle has vertices A(1, 1, 1), B(2, 3, 1) and C(1, 2, 3). Find the cosine of the interior angle at A.** |
| : [\frac{\sqrt7}{\sqrt3}](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%5Cfrac%7B%5Csqrt7%7D%7B%5Csqrt3%7D) | **Let the point P(2, -1, 0). Find the shortest distance from the point P to the line**  **[x y z]T = [1 1 0]T+t[2 -1 -1]T.** |
| 40 | **The volume of the pyramid with vertices (0 ; 0 ; 0) ; ( - 1 ; 8 ; 1) ; ( -16 ; 0 ; 1) and (2 ; 0 ;-2) is:** |
| 70 | **The volume of the pyramid with vertices (0; 0; 0); (-2; 8; 14); (-6; 7;-3) and (4; 0; 2) is:** |
| [\left[\frac{3}{5} \\\ \frac{-6}{5}\right]^{T}](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%5Cleft%5B%5Cfrac%7B3%7D%7B5%7D%20%5C%5C%5C%20%5Cfrac%7B-6%7D%7B5%7D%5Cright%5D%5E%7BT%7D) | **Let****[[T:R^2\rightarrow R^2](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=T%3AR%5E2%5Crightarrow%20R%5E2)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=T%3AR%5E2%5Crightarrow%20R%5E2" \o "TeX)be projection on the line y = 2x followed by reflection in the x-axis and let the vector v = [1   1]T. Find T(v).** |
| a+b=0 | **Determine whether x = (-2, -6, -4) lies in U = span{u=(2, 4, 3); v=(1, 1,1)}. If so, write x = a.u+b.v and find a+b.** |
| (i) | **Which of the following are subspaces of R3 ?  (i) {(x, y, z)| x2+y2=0}  (ii) {(x, 2y, x+2)| x, y are real numbers }** |
| 1 | **Find the dimension of the subspace U = {[x+2y+3z, -2x-4y-6z, 5x+10y+15z]| x, y, z are real numbers}.** |
| 2 | **Find the dimension of the subspace  U={[x, y, z, w]| x-2y+3z+4w = 0, 3x-5y+7z+8w = 0}** |
| a = 2; a= -2 | **Find all values of a such that {[1, 4, 5], [0, a, 1], [0, 4, a]} is dependent.** |
| (iii) | **Which of the following statements are true?**  **(i) if {X, Y} is orthogonal in Rn then {X, X+Y} is also orthogonal.**  **(ii) if {X,Y} and {Z, W} are both orthogonal then {X,Y,Z,W} is also orthogonal.**  **(iii) if {X, Y} is orthonormal then {X-Y, X+Y} is orthogonal.** |
| 2 | **Find the dimension of the null space of the matrix** **[A=\begin{bmatrix}1&2&-1&2&1\\1&2&2&0&1\\2&4&-2&3&1\end{bmatrix}](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=A%3D%5Cbegin%7Bbmatrix%7D1%262%26-1%262%261%5C%5C1%262%262%260%261%5C%5C2%264%26-2%263%261%5Cend%7Bbmatrix%7D)** |
| Rank A = 6, Dim Row A = 6, Dim Col A = 6 | **Solve the problem.  Let A be a 7 × 9 matrix. Suppose dim Null(A) = 3, find Rank A, Dim Row (A), and Dim Col (A).** |
| P and R | **Which of the following points lie on the line with parametric equations**  **x = 2+4t; y = 3-7t; z = 5t?**  **P(10; -11; 10); Q(-2; 4; 5); R(-2; 10; -5)** |
| 3 | **For what value of k are the two planes 3kx+y-5kz+10=0, 2x-3y+z+12=0 orthogonal?** |
| 1/3 | **Let Q be the point on the plane x+y+z=1 that is closet to P(1,1,1). Find the first coordinate of Q.** |
| [\sqrt5](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%5Csqrt5) | **Find the area of the triangle with the following vertices A(1, 1, -1), B(2, 0, 1), C(1, -1, 3).** |
| (1/5)[-2x-4y; x+2y] | **Let T be projection on the line y = 2x followed by rotation through****[[\frac{\pi}{2}](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%5Cfrac%7B%5Cpi%7D%7B2%7D)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%5Cfrac%7B%5Cpi%7D%7B2%7D" \o "TeX). Find T[x y].** |
| a+b+c = 1 | **Determine whether x = (5, 6) lies in U= span{u=(1, 2); v=(0, 1); w=(2, 3)}. If so, write x = a.u+ b.v +c.w then find a+b+c.** |
| None of the other choices is correct | **Which of the following are subspaces of R3 ?**  **(i) {(x,y,z)| z = 2x+3y+2}**  **(ii) {(x,y,z)| x2+y2=z2}** |
| 3 | **Find the dimension of the subspace U = span{[1, 1, 1], [2, 5, 2], [1, 2, 3]}.** |
| all numbers but 3 | **Find all values of x such that { [1, 1, 2, [-2, x, 1], [2, -1, 1]} is linearly independent** |
| 1 | **If we write X = [2 -3 2 7]T as a linear combination of the orthogonal basis of the subspace U = span{[2 -1 0 3]T ; [2 1 -2 -1]T} then the sum of coefficients equals** |
| 1 | **Find the dimension of Null(A) for** **[A=\left[\begin{array}{ccc}1&2&-9\\2&8&-38\\5&14&-65\end{array}\right]](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=A%3D%5Cleft%5B%5Cbegin%7Barray%7D%7Bccc%7D1%262%26-9%5C%5C2%268%26-38%5C%5C5%2614%26-65%5Cend%7Barray%7D%5Cright%5D)** |
| dim(Null(A)) = 3; dim(Col(A)) = 8 | **Let A be a 20x11 matrix, rank(A) = 8. Find dim(Null(A)); dim(Col(A)).** |
| (iii) | **Which of the following statements are true? (u, v in R3)**  **(i) || -5u || = -5|| u ||**  **(ii) || u-v || = || u || -|| v ||**  **(iii) If u, v, u+v are nonzero and u and (u+v) are parallel, then u and v are also parallel.** |
| [\frac{3}{5}](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%5Cfrac%7B3%7D%7B5%7D) | **Let u = (3, 4) and suppose v = (a, b) is a unit vector orthogonal to u. Then | b| equals:** |
| (4/3, -1/3, -2/3) | **Let the point P(2, -1, 0). Find the point Q on the plane x - y + z = 1 that is  closest to P.** |
| (ii) | **Let u = (u1, u2, u3); v = (v1, v2, v3); w = (w1, w2, w3). Which of the following statements are false?**  **(i)****[[(u\times v).v = 0](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%28u%5Ctimes%20v%29.v%20%3D%200)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%28u%5Ctimes%20v%29.v%20%3D%200" \o "TeX).**  **(ii)****[[\mid\mid u\times v\mid\mid = \mid\mid u\mid\mid.\mid\mid v\mid\mid.cos\theta](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%5Cmid%5Cmid%20u%5Ctimes%20v%5Cmid%5Cmid%20%3D%20%5Cmid%5Cmid%20u%5Cmid%5Cmid.%5Cmid%5Cmid%20v%5Cmid%5Cmid.cos%5Ctheta)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%5Cmid%5Cmid%20u%5Ctimes%20v%5Cmid%5Cmid%20%3D%20%5Cmid%5Cmid%20u%5Cmid%5Cmid.%5Cmid%5Cmid%20v%5Cmid%5Cmid.cos%5Ctheta" \o "TeX), where****[[\theta](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%5Ctheta)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%5Ctheta" \o "TeX)is an angle beetween****[[u](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=u)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=u" \o "TeX)and****[[v](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=v)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=v" \o "TeX).**  **(iii)****[(u\times v).w =det \left[\begin{array}{ccc}w_{1}& w_{2}& w_{3} \\ u_{1}& u_{2}& u_{3}\\v_{1}& v_{2}& v_{3} \end{array} \right]](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%28u%5Ctimes%20v%29.w%20%3Ddet%20%5Cleft%5B%5Cbegin%7Barray%7D%7Bccc%7Dw_%7B1%7D%26%20w_%7B2%7D%26%20w_%7B3%7D%20%5C%5C%20u_%7B1%7D%26%20u_%7B2%7D%26%20u_%7B3%7D%5C%5Cv_%7B1%7D%26%20v_%7B2%7D%26%20v_%7B3%7D%20%5Cend%7Barray%7D%20%5Cright%5D%20)** |
| (1/5)[-4x-3y; -3x+4y] | **Let T be reflection in the line y = 2x followed by rotation through****[[\frac{\pi}{2}](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%5Cfrac%7B%5Cpi%7D%7B2%7D)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%5Cfrac%7B%5Cpi%7D%7B2%7D" \o "TeX). Find T[x y].** |
| x lies B and the coefficient of b1 is 1 | **Given that b1 = [4, 4, -4], b2 = [2, -2, -1] , x = [-2, 10, -1]**  **Determine if x lies in span{b1, b2}*.***  **If x lies in *B* then find u such that x = ub1 +vb2** |
| (i) | **Which of the following are subspaces of R3?  (i) {(x,y3,z5)| x, y, z are real numbers}  (ii) {(x, y, z)| x+y3+z5=0}** |
| 2 | **Find the dimension of the subspace U = {[2x+y+z; 4x+2y+z; 6x+3y+z ]}.** |
| {[1, 2, 3]} | **Let U = {[x, y, z]| x - 2y + z = 0, x + y - z = 0}. Which of the following is a basis for U?** |
| both of (i) and (ii) | **Given that v1 = [1, -3, 5], v2 =[-3, 8, -2], v3 = [2, -2, 4]. Which of the following statements are true?**  **i) {v1, v2, v3} is linearly independent**  **ii) {v1, v2, v3} is a basis of R3** |
| [a = \frac{1}{\sqrt6}](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%20a%20%3D%20%5Cfrac%7B1%7D%7B%5Csqrt6%7D)or [-\frac{1}{\sqrt6}](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=-%5Cfrac%7B1%7D%7B%5Csqrt6%7D%20) | **Find a so that B = {(****[\frac{1}{\sqrt3}, \frac{1}{\sqrt3},\frac{1}{\sqrt3}), (-\frac{1}{\sqrt2},\frac{1}{\sqrt2},0) ,(a,b,c)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%5Cfrac%7B1%7D%7B%5Csqrt3%7D%2C%20%5Cfrac%7B1%7D%7B%5Csqrt3%7D%2C%5Cfrac%7B1%7D%7B%5Csqrt3%7D%29%2C%20%28-%5Cfrac%7B1%7D%7B%5Csqrt2%7D%2C%5Cfrac%7B1%7D%7B%5Csqrt2%7D%2C0%29%20%2C%28a%2Cb%2Cc%29)} is an orthonormal set.** |
| {(-4;-2;1;0;0); (-5;1;0;0;1)} | **Find a basis of null A for****[A=\left[\begin{matrix}1&-1&2&4&6\\0&1&2&1&-1\\0&0&0&1&0 \end{matrix}\right]](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=A%3D%5Cleft%5B%5Cbegin%7Bmatrix%7D1%26-1%262%264%266%5C%5C0%261%262%261%26-1%5C%5C0%260%260%261%260%20%5Cend%7Bmatrix%7D%5Cright%5D)** |
| (i) only | **Let A is a 150x350 matrix. Which of the following statements are true? (i) dim(Null(A)) must be at least 200. (ii) dim(col(A)) + dim(row(A)) = 500** |
| None of the other choices is correct | **Let P(1,2,1), Q(1,0,-1), R(2,2,0) be the vertices of a parallelogram with adjacent sides RP and RQ. Find the other vertex S.** |
| -11/4 | **If || u-v || = 6, || u+v || = 5 then u.v is:** |
| [\sqrt{\frac{28}{3}}](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%5Csqrt%7B%5Cfrac%7B28%7D%7B3%7D%7D) | **Let the point P(-1, -1, 2). Find the shortest distance from the point P to the line**  **[x  y  z]T = [1  1  0]T+t[2  -1  -1]T.** |
| 1/5 | **Let****[[T:R^{2}\rightarrow R^{2}](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=T%3AR%5E%7B2%7D%5Crightarrow%20R%5E%7B2%7D)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=T%3AR%5E%7B2%7D%5Crightarrow%20R%5E%7B2%7D" \o "TeX)be reflection in the x-axis followed by reflection in the line****[[y=2x](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=y%3D2x)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=y%3D2x" \o "TeX). Find the sum of all entries in the first column of the matrix of****[[T](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=T)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=T" \o "TeX).** |
| 3/2 | **Find all values of *a* so that the vector [5, 3, *a*] is in span{[3, 2, 0], [1, 0, 3]}** |
| (i) only | **Which of the following are subspaces of R3?  (i) {(x, y, z)| 2x-y+3z=0}  (ii) (x, y, z)| xy=0}** |
| 2 | **Find the dimension of the subspace U = {[x, y, z, t] | x+4y-z = 0; x-2z+ t= 0}.** |
| (i) and (ii) | **Let the set of vectors {u, v, w} in R3 be independent. Which of the followings are true?**  **(i) {2u; 3v } is also independent.**  **(ii) {u; v; w-u-v } is also independent.** |
| (a+b+c)/3 | **Let X = [a, b, c]. Let U be the subspace spanned by the orthogonal basis  {u = [1, 1, 1], v = [1, -1, 0], w = [1, 1, -2]}.  Find the coefficient of u when expressing X as a linear combination of {u, v, w}.** |
| 3 | **Find the dimension of the subspace spanned by  [1, 1, 0, 9], [1, 1, 0, -1], [0, 0, 1, 7], [0, 0, 1, 0]** |
| (ii) | **Let A be 4 x 7 matrix that has dim(Null(A)) = 5. Choose the correct statements:  (i) A has exactly 5 independent columns  (ii) A has exactly 2 independent rows** |
| A only | **Which of the following points lie on the line x = 2-t; y = 1+t; z = 7-2t?**  **(i) A(-3, 6, -3)**  **(i) B(0, 3, 0)** |
| [\sqrt{43}](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%5Csqrt%7B43%7D) | **If u and v are vectors in R3 such that || u || =2, || v || =5, u.v =7, find || u+v ||.** |
| [\frac{5}{\sqrt{13}}](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%5Cfrac%7B5%7D%7B%5Csqrt%7B13%7D%7D) | **Find the shortest distance between the pair of parallel lines [x  y  z]T = [1  1  1]T+t[-2  0  3]T and  [x  y  z]T = [0  1  0]T+t[-2  0  3]T** |
| 3/5 | **Let****[[T:R^{2}\rightarrow R^{2}](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=T%3AR%5E%7B2%7D%5Crightarrow%20R%5E%7B2%7D)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=T%3AR%5E%7B2%7D%5Crightarrow%20R%5E%7B2%7D" \o "TeX)be projection on the y-axis followed by reflection in the line****[[y=-2x](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=y%3D-2x)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=y%3D-2x" \o "TeX). Find the sum of (1,1)-entry and (2,2)-entry of the matrix of****[[T](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=T)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=T" \o "TeX).** |
| 3 | **Let u = (3, 3, 6), v = (4, 4, 3), w = (-6, 3, 3) and x = (41, 5, 12). We can write x as  x = au + bv + cw,  where a, b, c are numbers. Find a.** |
| (i) and (ii) | **Which of the following are subspaces of R2**  **(i) {(x,y): 2x+7y = 0}**  **(ii) {(x,y): y=0}** |
| -4; 1 | **For what values of x are the vectors [1, -1, 2], [1, x, -4], [-1, 0, x] linearly dependent?** |
| 3 | **Find the dimension of the null space of the matrix**  **[A=\left[\begin{matrix} 1&-2&3&-3&-1\\-2&5&-5&4&-4\\-1&3&-2&1&-5\end{matrix}\right]](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=A%3D%5Cleft%5B%5Cbegin%7Bmatrix%7D%201%26-2%263%26-3%26-1%5C%5C-2%265%26-5%264%26-4%5C%5C-1%263%26-2%261%26-5%5Cend%7Bmatrix%7D%5Cright%5D)** |
| dim(row(A) = 4; dim(null(A) = 4 | **Let A be a 10x8 matrix, rank(A) = 4. Find dim(row(A)); dim(null(A)).** |
| It does not exist | **Find the point of intersection (if any) of the following pair of lines:**  **d1: x =3+t; y =-1+t; z = 2-t**  **d2: x = 1+2s; y = 1; z = -2+3s** |
| x-12y+9z=2 | **Find the equation of the plane passing through the points P(2, 3, 4) and Q(-1, 2, 3) and parallel to the vector w = (3, 4, 5).** |
| 1/5 | **Find the shortest distance between the pair of parallel lines [x  y  z]T = [1  1  1]T+t[3  0  4]T and  [x  y  z]T = [0  1  0]T+t[3  0  4]T** |
| Projection on the line y = -x | **If****[[T:R^{2} \rightarrow R^{2}; T\left[ \begin{array}{c} x \\ y \\ \end{array} \right] =\left[ \begin{array}{c} \frac{x-y}{2} \\ \frac{y-x}{2} \\ \end{array} \right]](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=T%3AR%5E%7B2%7D%20%5Crightarrow%20R%5E%7B2%7D%3B%20T%5Cleft%5B%20%5Cbegin%7Barray%7D%7Bc%7D%20x%20%5C%5C%20y%20%5C%5C%20%5Cend%7Barray%7D%20%5Cright%5D%20%3D%5Cleft%5B%20%5Cbegin%7Barray%7D%7Bc%7D%20%5Cfrac%7Bx-y%7D%7B2%7D%20%5C%5C%20%5Cfrac%7By-x%7D%7B2%7D%20%5C%5C%20%5Cend%7Barray%7D%20%5Cright%5D%20)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=T%3AR%5E%7B2%7D%20%5Crightarrow%20R%5E%7B2%7D%3B%20T%5Cleft%5B%20%5Cbegin%7Barray%7D%7Bc%7D%20x%20%5C%5C%20y%20%5C%5C%20%5Cend%7Barray%7D%20%5Cright%5D%20%3D%5Cleft%5B%20%5Cbegin%7Barray%7D%7Bc%7D%20%5Cfrac%7Bx-y%7D%7B2%7D%20%5C%5C%20%5Cfrac%7By-x%7D%7B2%7D%20%5C%5C%20%5Cend%7Barray%7D%20%5Cright%5D%20" \o "TeX).  Determine if T is projection on a line, reflection in a line, or rotation through an angle, and find the line or angle.** |
| 2 | **If x = au1 +bu2 then find a+b.  u1 = [2, -4] , u2 = [12, 6], x =[-26, -38]** |
| (ii) only | **Which of the following are subspaces of R3 ?**  **(i) {(x,y,z)| z = (x+y)2}**  **(ii) {(x,y,z)| x=10z}** |
| 2 | **Find the dimension of the subspace  U={[a+c, b+c, a+2c+b] | a, b, c in R}** |
| {[1, 2, 3]} | **Let U = {[x, y, z]| x - 2y + z = 0, x + y - z = 0}. Which of the following is a basis for U?** |
| (ii) only | **Let the set of vectors {u, v, w} in R3 be dependent. Which of the followings are true?**  **(i) w must be a linear combination of u and v.**  **(ii) There exists (a, b, c) with a2+b2+c2 not zero such that a.u + b.v + c.w = 0** |
| 2 | **Find the dimension of the null space of the matrix** **[A=\left[\begin{matrix} 1&-2&-1&-1\\0&1&4&1\\1&-1&3&0\end{matrix}\right]](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=A%3D%5Cleft%5B%5Cbegin%7Bmatrix%7D%201%26-2%26-1%26-1%5C%5C0%261%264%261%5C%5C1%26-1%263%260%5Cend%7Bmatrix%7D%5Cright%5D)** |
| dim(col(A))=5, dim(null(A))=4 | **If A is a 7 × 9 matrix has rank 5, find dim(Col(A)), dim(Null(A))** |
| (2, 4, 2) | **Let P(1,2,1), Q(1,0,-1), R(2,2,0) be the vertices of a parallelogram with adjacent sides QP and QR. Find the other vertex S.** |
| [x=-5+11t, y = 5t, z= 1-2t](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=x%3D-5%2B11t%2C%20y%20%3D%205t%2C%20z%3D%201-2t) | **Parametric equations of the line containing (-5, 0, 1) and which is parallel to the two planes 2x-4y+z= 0 and x-3y-2z = 1 are:** |
| None of the other choices is correct | **Let Q be the point on the line x = 1+t, y = -2 + 3t, z = 1 - t that is closet to the point P(1,0,1). Find the first coordinate of Q.** |
| -4/5 | **Let****[[T:R^{2}\rightarrow R^{2}](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=T%3AR%5E%7B2%7D%5Crightarrow%20R%5E%7B2%7D)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=T%3AR%5E%7B2%7D%5Crightarrow%20R%5E%7B2%7D" \o "TeX)be rotation through****[[\frac{\pi}{2}](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%5Cfrac%7B%5Cpi%7D%7B2%7D)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%5Cfrac%7B%5Cpi%7D%7B2%7D" \o "TeX)followed by reflection in the line****[[y=2x](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=y%3D2x)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=y%3D2x" \o "TeX). Find the (2,2)-entry of the matrix of****[[T](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=T)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=T" \o "TeX).** |
| (i) ony | **Which of the followings are true?**  **(i) R2 = span{[1, 2]T, [0, 1]T, [2, 3]T}.**  **(ii) R3 = span{[1, 1, 1]T; [0, 0, 1]T}.** |
| (i) | **Which of the following is a subspace of R4?  (i) {(a,b,c,d)| a=b=0}  (ii) {(a,b,c,d)| a=1, b=0 and c+d=1}  (iii) { (a,b,c,d)| a>0 and b<0}** |
| 1 | **Find the dimension of the subspace U = {[x+2y+3z, -2x-4y-6z, 5x+10y+15z]| x, y, z are real numbers}.** |
| 2 | **Find the dimension of the subspace U = {[x, y, z, t] | x+4y-z = 0; x-2z+ t= 0}.** |
| all of them | **Which of the following statements are FALSE?  (i) The set S = {[-1, 5], [3, -15]}spans R2 (ii) The set S = {[-1, 5], [3, -15]}is linearly independent. (iii) The set S = {[-1, 5], [3, -15]}is a basis of R2** |
| 1 | **Find the number a such that the set {[1 2 1 0]T, [1 -1 1 3]T, [2 -1 0 -1]T, [a b c 1]T } is orthogonal.** |
| 3 | **Find the dimension of the subspace spanned by the vectors  {[1, 1, 1], [-1, 1, -1], [1, 1, 3], [0, 2, 1]}** |
| 3 | **Let A be a 3 x 5 matrix. If dim(null(A))=2, then the dimension of the column space of A is** |
| x=(2/6; 3/6; 10/6) | **Let u = (2; 1; 2) and v = (-1; 0; 1). Find x such that**  **3u + 7v =|| u || (2x+v)** |
| [\frac{-1}{2}](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%5Cfrac%7B-1%7D%7B2%7D) | **if || X || = 2, || Y || =1 and || X-3Y || = 4, compute X.Y** |
| [\frac{1}{\sqrt{42}}](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%5Cfrac%7B1%7D%7B%5Csqrt%7B42%7D%7D) | **Find the shortest distance between the pair of nonparallel lines [x  y  z]T = [1  -1  -1]T+t[2  3  1]T and  [x  y  z]T = [1  -2  -1]T+t[3  2  2]T .** |
| [\sqrt{56}](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%5Csqrt%7B56%7D) | **Let u = (2, 0, 1); v = (3, 1, 0). Find the length of the vector u x (100u+2v).** |
| T is a projection on a line y= -2x | **If****[[T:R^{2} \rightarrow R^{2}; T\left[ \begin{array}{c} x \\ y \\ \end{array} \right] =\left[ \begin{array}{c} \frac{x-2y}{5} \\ \frac{-2x+4y}{5} \\ \end{array} \right]](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=T%3AR%5E%7B2%7D%20%5Crightarrow%20R%5E%7B2%7D%3B%20T%5Cleft%5B%20%5Cbegin%7Barray%7D%7Bc%7D%20x%20%5C%5C%20y%20%5C%5C%20%5Cend%7Barray%7D%20%5Cright%5D%20%3D%5Cleft%5B%20%5Cbegin%7Barray%7D%7Bc%7D%20%5Cfrac%7Bx-2y%7D%7B5%7D%20%5C%5C%20%5Cfrac%7B-2x%2B4y%7D%7B5%7D%20%5C%5C%20%5Cend%7Barray%7D%20%5Cright%5D%20)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=T%3AR%5E%7B2%7D%20%5Crightarrow%20R%5E%7B2%7D%3B%20T%5Cleft%5B%20%5Cbegin%7Barray%7D%7Bc%7D%20x%20%5C%5C%20y%20%5C%5C%20%5Cend%7Barray%7D%20%5Cright%5D%20%3D%5Cleft%5B%20%5Cbegin%7Barray%7D%7Bc%7D%20%5Cfrac%7Bx-2y%7D%7B5%7D%20%5C%5C%20%5Cfrac%7B-2x%2B4y%7D%7B5%7D%20%5C%5C%20%5Cend%7Barray%7D%20%5Cright%5D%20" \o "TeX). Determine if T is projection on a line, reflection in a line, or rotation through an angle, and find the line or angle.** |
| -2 | **Let u1 = [-2, 0, 1] , u2 = [3, 5, 6] , u3 = [-2, 6, -4] , x = [-2, -32, -19]**  **If express the vector x as**  **x=au1 +bu2+cu3**  **then find c.** |
| None of the other choices is correct | **Which of the following are subspaces of R2 ?**  **(i) {(x,y)| x=y2}**  **(ii) {(x,y)| xy > 0 or xy = 0}** |
| 2 | **Find the dimension of the subspace  U={[x, y, z, w]| x-2y+3z+4w = 0, 3x-5y+7z+8w = 0}** |
| dim H = 2 | **Find the dimension of the subspace**  **H = { [a+2b+2d, c+d, -3a-6b+4c-2d, -c-d] | a, b, c, d in R}** |
| 1 | **For what values of a is the set  {[1, 1, 1], [1, 0, 2], [1, a, 1]}  linearly dependent?** |
| 1 | **If we write X = [2 -3 2 7]T as a linear combination of the orthogonal basis of the subspace U = span{[2 -1 0 3]T ; [2 1 -2 -1]T} then the sum of coefficients equals** |
| 2 | **Find the dimension of the following subspace of R4  U=span{[1, 3, -1, -3], [2, 4,1, 0], [1, 5, -4, -9]}.** |
| (i) only | **Let A be a 3 x 5 matrix and let dim(null(A))=2. Which of the following statements are true?**  **(i) All bases of the Col(A) have three vectors.**  **(ii) dim(Row(A)) = 1** |
| a=0; b = 4 | **Find all values of a and b such that A(a, b, 2) lies on the line x = 1+t; y = 2 - 2t; z = 1-t.** |
| none of the other choice is true | **An equation for the plane passing through the points (2, 1, 3), (1, 0, -1) and (4, -2, 0) is** |
| 2 | **Let the point P(2, -1, 3). Find the third coodinate of the point Q on the plane x - 2y + z = 1 that is  closest to P.** |
| Reflection in the line y = 3x | **If****[[T:R^{2} \rightarrow R^{2}; T\left[\begin{array}{c}x \\y \\\end{array}\right] =\left[\begin{array}{c}\frac{-8x+6y}{10} \\\frac{6x+8y}{10} \\\end{array}\right]](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=T%3AR%5E%7B2%7D%20%5Crightarrow%20R%5E%7B2%7D%3B%20T%5Cleft%5B%5Cbegin%7Barray%7D%7Bc%7Dx%20%5C%5Cy%20%5C%5C%5Cend%7Barray%7D%5Cright%5D%20%3D%5Cleft%5B%5Cbegin%7Barray%7D%7Bc%7D%5Cfrac%7B-8x%2B6y%7D%7B10%7D%20%5C%5C%5Cfrac%7B6x%2B8y%7D%7B10%7D%20%5C%5C%5Cend%7Barray%7D%5Cright%5D%20)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=T%3AR%5E%7B2%7D%20%5Crightarrow%20R%5E%7B2%7D%3B%20T%5Cleft%5B%5Cbegin%7Barray%7D%7Bc%7Dx%20%5C%5Cy%20%5C%5C%5Cend%7Barray%7D%5Cright%5D%20%3D%5Cleft%5B%5Cbegin%7Barray%7D%7Bc%7D%5Cfrac%7B-8x%2B6y%7D%7B10%7D%20%5C%5C%5Cfrac%7B6x%2B8y%7D%7B10%7D%20%5C%5C%5Cend%7Barray%7D%5Cright%5D%20" \o "TeX).  Determine if T is projection on a line, reflection in a line, or rotation through an angle, and find the line or angle.** |
| a=1 | **Find a such that x = (3, 2, a) lies in U = span{(3, 1, 2), (-1, 1, -2), (2, -1, 3)}.** |
| (ii) only | **Which of the following are subspaces of R3?**  **(i) {(x, y, z)| xz > 0 or xz = 0}**  **(ii){(x, y, z)| x=y}** |
| (i) ony | **Let the set of vectors {u, v, w} in R3 be independent. Which of the followings are true?**  **(i) {u; v; u-v+w} is also independent.**  **(ii) {u; v+w; u+v+w} is also independent.** |
| [a = \frac{1}{\sqrt6}](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%20a%20%3D%20%5Cfrac%7B1%7D%7B%5Csqrt6%7D)or [-\frac{1}{\sqrt6}](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=-%5Cfrac%7B1%7D%7B%5Csqrt6%7D%20) | **Find a so that B = {(****[\frac{1}{\sqrt3}, \frac{1}{\sqrt3},\frac{1}{\sqrt3}), (-\frac{1}{\sqrt2},\frac{1}{\sqrt2},0) ,(a,b,c)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%5Cfrac%7B1%7D%7B%5Csqrt3%7D%2C%20%5Cfrac%7B1%7D%7B%5Csqrt3%7D%2C%5Cfrac%7B1%7D%7B%5Csqrt3%7D%29%2C%20%28-%5Cfrac%7B1%7D%7B%5Csqrt2%7D%2C%5Cfrac%7B1%7D%7B%5Csqrt2%7D%2C0%29%20%2C%28a%2Cb%2Cc%29)} is an orthonormal set.** |
| dim Nul A = 3, dim Col A = 2 | **Find the dimensions of the null space and the column space of the given matrix.**  **[A=\left[\begin{matrix} 1&-3&-5&3&0\\-2&1&3&-4&1\\-1&-2&-2&-1&1\end{matrix}\right]](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=A%3D%5Cleft%5B%5Cbegin%7Bmatrix%7D%201%26-3%26-5%263%260%5C%5C-2%261%263%26-4%261%5C%5C-1%26-2%26-2%26-1%261%5Cend%7Bmatrix%7D%5Cright%5D)** |
| Both (i) and (ii) | **Let A is a 100x200 matrix. Which of the following statements are true? (i) dim(Null(A)) must be at least 100. (ii) dim(null(A)) + dim(row(A)) = 200** |
| [\frac{3\sqrt6}{2}](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%5Cfrac%7B3%5Csqrt6%7D%7B2%7D) | **If u = (3, 3, 6) and v = (2, -1, 1), then the length of the projection of u along v is:** |
| -4/5 | **Let****[[T:R^{2}\rightarrow R^{2}](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=T%3AR%5E%7B2%7D%5Crightarrow%20R%5E%7B2%7D)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=T%3AR%5E%7B2%7D%5Crightarrow%20R%5E%7B2%7D" \o "TeX)be rotation through****[[\frac{-\pi}{2}](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%5Cfrac%7B-%5Cpi%7D%7B2%7D)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%5Cfrac%7B-%5Cpi%7D%7B2%7D" \o "TeX)followed by reflection in the line****[[y=3x](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=y%3D3x)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=y%3D3x" \o "TeX). Find (2,1)-entry of the matrix of****[[T](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=T)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=T" \o "TeX).** |
| 2 | **Let u = (3, 3, 6), v = (4, 4, 3), w = (-6, 3, 3) and x = (41, 5, 12). We can write  x = au + bv + cw,  where a, b, c are numbers. Find b.** |
| (i) | **Which of the following are subspaces of R3 ?  (i) {(x, y, z)| x2+y2=0}  (ii) {(x, 2y, x+2)| x, y are real numbers }** |
| both of (i) and (ii) | **Given that v1 = [1, -3, 5], v2 =[-3, 8, -2], v3 = [2, -2, 4]. Which of the following statements are true?**  **i) {v1, v2, v3} is linearly independent**  **ii) {v1, v2, v3} is a basis of R3** |
| 2 | **Find the dimension of the following subspace of R4  U=span{[1, 3, -1, -3], [2, 4,1, 0], [1, 5, -4, -9]}.** |
| dim(Null(A)) = 3; dim(Col(A)) = 8 | **Let A be a 20x11 matrix, rank(A) = 8. Find dim(Null(A)); dim(Col(A)).** |
| (2, 0, -2) | **Let P(1,2,1), Q(1,0,-1), R(2,2,0) be the vertices of a parallelogram with adjacent sides PQ and PR. Find the other vertex S.** |
| (9/7)(2, 1, 3) | **If u = (3, 3, 3) and v = (2, 1, 3), find projv (u).** |
| [\sqrt{\frac{28}{3}}](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%5Csqrt%7B%5Cfrac%7B28%7D%7B3%7D%7D) | **Let the point P(-1, -1, 2). Find the shortest distance from the point P to the line**  **[x  y  z]T = [1  1  0]T+t[2  -1  -1]T.** |
| (0, 0 -12) | **Consider the points A(1; 2; 3); B(1; 3; 2) and C(2; 1; 3). Find a point D on the Z-axis so that**  **the volume of the tetrahedron ABCD is 3.** |
| None of the other choices is true | **If****[[T:R^{2} \rightarrow R^{2}; T\left[ \begin{array}{c} x \\ y \\ \end{array} \right] =\left[ \begin{array}{c} \frac{x-\sqrt3y}{2} \\ \frac{\sqrt3x+y}{2} \\ \end{array} \right]](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=T%3AR%5E%7B2%7D%20%5Crightarrow%20R%5E%7B2%7D%3B%20T%5Cleft%5B%20%5Cbegin%7Barray%7D%7Bc%7D%20x%20%5C%5C%20y%20%5C%5C%20%5Cend%7Barray%7D%20%5Cright%5D%20%3D%5Cleft%5B%20%5Cbegin%7Barray%7D%7Bc%7D%20%5Cfrac%7Bx-%5Csqrt3y%7D%7B2%7D%20%5C%5C%20%5Cfrac%7B%5Csqrt3x%2By%7D%7B2%7D%20%5C%5C%20%5Cend%7Barray%7D%20%5Cright%5D%20)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=T%3AR%5E%7B2%7D%20%5Crightarrow%20R%5E%7B2%7D%3B%20T%5Cleft%5B%20%5Cbegin%7Barray%7D%7Bc%7D%20x%20%5C%5C%20y%20%5C%5C%20%5Cend%7Barray%7D%20%5Cright%5D%20%3D%5Cleft%5B%20%5Cbegin%7Barray%7D%7Bc%7D%20%5Cfrac%7Bx-%5Csqrt3y%7D%7B2%7D%20%5C%5C%20%5Cfrac%7B%5Csqrt3x%2By%7D%7B2%7D%20%5C%5C%20%5Cend%7Barray%7D%20%5Cright%5D%20" \o "TeX). Determine if T is projection on a line, reflection in a line, or rotation through an angle, and find the line or angle.** |
| a+b=0 | **Determine whether x = (-2, -6, -4) lies in U = span{u=(2, 4, 3); v=(1, 1,1)}. If so, write x = a.u+b.v and find a+b.** |
| (i) only | **Which of the following are subspaces of R3?  (i) {(x, y, z)| 2x-y+3z=0}  (ii) (x, y, z)| xy=0}** |
| 2 | **Find the dimension of the subspace U = {[x, y, z, t] | x+4y-z = 0; x-2z+ t= 0}.** |
| all numbers but 3 | **Find all values of x such that { [1, 1, 2, [-2, x, 1], [2, -1, 1]} is linearly independent** |
| [rank(A)=2](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=rank%28A%29%3D2)and [\dim(null(A))=2](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%5Cdim%28null%28A%29%29%3D2) | **Let****[[A=\begin{bmatrix} 1&-2& 1& 1\\-2& 4& 3& -2\end{bmatrix}](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=A%3D%5Cbegin%7Bbmatrix%7D%201%26-2%26%201%26%201%5C%5C-2%26%204%26%203%26%20-2%5Cend%7Bbmatrix%7D)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=A%3D%5Cbegin%7Bbmatrix%7D%201%26-2%26%201%26%201%5C%5C-2%26%204%26%203%26%20-2%5Cend%7Bbmatrix%7D" \o "TeX). Find rank(A) and dim(null(A).** |
| dim(Im(A)) = 2, dim(Null(A)) = 7 | **If A is a 5 × 9 matrix that has rank 2, find dim(Im(A)), dim(Null(A))** |
| [x, y, z] = [0, 1, 1] +t [-3, 4, 2] | **Find an equation of the line passing through P(0,1,1) and perpendicular to the two lines  (d1) [x, y, z] = [1,1,1] + t [0, -1, 2]  (d2) [x, y, z] = [1,0, -1] + t [2, 1, 1]** |
| [\frac{-1}{\sqrt{21}}](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%5Cfrac%7B-1%7D%7B%5Csqrt%7B21%7D%7D) | **If U = (1; 1;-1); V = (0; 2;-1); W = (1;-3; 3); then the cosine of the angle between V x W**  **and U x V is:** |
| T is projection on the line 2x-3y = 0 | **If****[[T:R^{2} \rightarrow R^{2}; T\left[\begin{array}{c}x \\y \\\end{array}\right] =\left[\begin{array}{c}\frac{9x+6y}{13} \\\frac{6x+4y}{13} \\\end{array}\right]](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=T%3AR%5E%7B2%7D%20%5Crightarrow%20R%5E%7B2%7D%3B%20T%5Cleft%5B%5Cbegin%7Barray%7D%7Bc%7Dx%20%5C%5Cy%20%5C%5C%5Cend%7Barray%7D%5Cright%5D%20%3D%5Cleft%5B%5Cbegin%7Barray%7D%7Bc%7D%5Cfrac%7B9x%2B6y%7D%7B13%7D%20%5C%5C%5Cfrac%7B6x%2B4y%7D%7B13%7D%20%5C%5C%5Cend%7Barray%7D%5Cright%5D%20)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=T%3AR%5E%7B2%7D%20%5Crightarrow%20R%5E%7B2%7D%3B%20T%5Cleft%5B%5Cbegin%7Barray%7D%7Bc%7Dx%20%5C%5Cy%20%5C%5C%5Cend%7Barray%7D%5Cright%5D%20%3D%5Cleft%5B%5Cbegin%7Barray%7D%7Bc%7D%5Cfrac%7B9x%2B6y%7D%7B13%7D%20%5C%5C%5Cfrac%7B6x%2B4y%7D%7B13%7D%20%5C%5C%5Cend%7Barray%7D%5Cright%5D%20" \o "TeX).  Determine if T is projection on a line, reflection in a line, or rotation through an angle, and find the line or angle.** |
| 2 | **If x = au1 +bu2 then find a+b.  u1 = [2, -4] , u2 = [12, 6], x =[-26, -38]** |
| None of the other choices is correct | **Which of the following are subspaces of R2 ?**  **(i) {(x,y)| x=y2}**  **(ii) {(x,y)| xy > 0 or xy = 0}** |
| 2 | **Find the dimension of the subspace  U={[x, y, z, w]| x-2y+3z+4w = 0, 3x-5y+7z+8w = 0}** |
| {[1, 2, 3]} | **Let U = {[x, y, z]| x - 2y + z = 0, x + y - z = 0}. Which of the following is a basis for U?** |
| (i) ony | **Let the set of vectors {u, v, w} in R3 be independent. Which of the followings are true?**  **(i) {u; v; u-v+w} is also independent.**  **(ii) {u; v+w; u+v+w} is also independent.** |
| 3 | **Find the dimension of the null space of the matrix**  **[A=\left[\begin{matrix} 1&-2&3&-3&-1\\-2&5&-5&4&-4\\-1&3&-2&1&-5\end{matrix}\right]](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=A%3D%5Cleft%5B%5Cbegin%7Bmatrix%7D%201%26-2%263%26-3%26-1%5C%5C-2%265%26-5%264%26-4%5C%5C-1%263%26-2%261%26-5%5Cend%7Bmatrix%7D%5Cright%5D)** |
| (ii) | **Let A be 4 x 7 matrix that has dim(Null(A)) = 5. Choose the correct statements:  (i) A has exactly 5 independent columns  (ii) A has exactly 2 independent rows** |
| 2x-4y+z-38=0 | **Find an equation of the plane which passes through the point Q(1, -7, 8) and perpendicular to the line with parametric equations  x= 2+ 2t, y = 7-4t, z = -3+t** |
| 2/3 | **Let Q be the point on the plane x+y+z=1 that is closet to P(1,0,1). Find the first coordinate of Q.** |
| Projection on the line y = -x | **If****[[T:R^{2} \rightarrow R^{2}; T\left[ \begin{array}{c} x \\ y \\ \end{array} \right] =\left[ \begin{array}{c} \frac{x-y}{2} \\ \frac{y-x}{2} \\ \end{array} \right]](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=T%3AR%5E%7B2%7D%20%5Crightarrow%20R%5E%7B2%7D%3B%20T%5Cleft%5B%20%5Cbegin%7Barray%7D%7Bc%7D%20x%20%5C%5C%20y%20%5C%5C%20%5Cend%7Barray%7D%20%5Cright%5D%20%3D%5Cleft%5B%20%5Cbegin%7Barray%7D%7Bc%7D%20%5Cfrac%7Bx-y%7D%7B2%7D%20%5C%5C%20%5Cfrac%7By-x%7D%7B2%7D%20%5C%5C%20%5Cend%7Barray%7D%20%5Cright%5D%20)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=T%3AR%5E%7B2%7D%20%5Crightarrow%20R%5E%7B2%7D%3B%20T%5Cleft%5B%20%5Cbegin%7Barray%7D%7Bc%7D%20x%20%5C%5C%20y%20%5C%5C%20%5Cend%7Barray%7D%20%5Cright%5D%20%3D%5Cleft%5B%20%5Cbegin%7Barray%7D%7Bc%7D%20%5Cfrac%7Bx-y%7D%7B2%7D%20%5C%5C%20%5Cfrac%7By-x%7D%7B2%7D%20%5C%5C%20%5Cend%7Barray%7D%20%5Cright%5D%20" \o "TeX).  Determine if T is projection on a line, reflection in a line, or rotation through an angle, and find the line or angle.** |
| x lies B and the coefficient of b1 is 1 | **Given that b1 = [4, 4, -4], b2 = [2, -2, -1] , x = [-2, 10, -1]**  **Determine if x lies in span{b1, b2}*.***  **If x lies in *B* then find u such that x = ub1 +vb2** |
| (ii) only | **Which of the following are subspaces of R3?**  **(i) {(x, y, z)| xz > 0 or xz = 0}**  **(ii){(x, y, z)| x=y}** |
| 1 | **Find the dimension of the subspace U = {[x+2y+3z, -2x-4y-6z, 5x+10y+15z]| x, y, z are real numbers}.** |
| -4; 1 | **For what values of x are the vectors [1, -1, 2], [1, x, -4], [-1, 0, x] linearly dependent?** |
| [a = \frac{1}{\sqrt6}](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%20a%20%3D%20%5Cfrac%7B1%7D%7B%5Csqrt6%7D)or [-\frac{1}{\sqrt6}](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=-%5Cfrac%7B1%7D%7B%5Csqrt6%7D%20) | **Find a so that B = {(****[\frac{1}{\sqrt3}, \frac{1}{\sqrt3},\frac{1}{\sqrt3}), (-\frac{1}{\sqrt2},\frac{1}{\sqrt2},0) ,(a,b,c)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%5Cfrac%7B1%7D%7B%5Csqrt3%7D%2C%20%5Cfrac%7B1%7D%7B%5Csqrt3%7D%2C%5Cfrac%7B1%7D%7B%5Csqrt3%7D%29%2C%20%28-%5Cfrac%7B1%7D%7B%5Csqrt2%7D%2C%5Cfrac%7B1%7D%7B%5Csqrt2%7D%2C0%29%20%2C%28a%2Cb%2Cc%29)} is an orthonormal set.** |
| 2 | **Find the dimension of the null space of the matrix** **[A=\left[\begin{matrix} 1&-2&-1&-1\\0&1&4&1\\1&-1&3&0\end{matrix}\right]](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=A%3D%5Cleft%5B%5Cbegin%7Bmatrix%7D%201%26-2%26-1%26-1%5C%5C0%261%264%261%5C%5C1%26-1%263%260%5Cend%7Bmatrix%7D%5Cright%5D)** |
| 3 | **Let A be a 3 x 5 matrix. If dim(null(A))=2, then the dimension of the column space of A is** |
| -3 or -2 | **For what value of k are (k, k, 1) and (k, 5, 6) orthogonal?** |
| (4/3, -1/3, -2/3) | **Let the point P(2, -1, 0). Find the point Q on the plane x - y + z = 1 that is  closest to P.** |
| T is a projection on a line y= -2x | **If****[[T:R^{2} \rightarrow R^{2}; T\left[ \begin{array}{c} x \\ y \\ \end{array} \right] =\left[ \begin{array}{c} \frac{x-2y}{5} \\ \frac{-2x+4y}{5} \\ \end{array} \right]](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=T%3AR%5E%7B2%7D%20%5Crightarrow%20R%5E%7B2%7D%3B%20T%5Cleft%5B%20%5Cbegin%7Barray%7D%7Bc%7D%20x%20%5C%5C%20y%20%5C%5C%20%5Cend%7Barray%7D%20%5Cright%5D%20%3D%5Cleft%5B%20%5Cbegin%7Barray%7D%7Bc%7D%20%5Cfrac%7Bx-2y%7D%7B5%7D%20%5C%5C%20%5Cfrac%7B-2x%2B4y%7D%7B5%7D%20%5C%5C%20%5Cend%7Barray%7D%20%5Cright%5D%20)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=T%3AR%5E%7B2%7D%20%5Crightarrow%20R%5E%7B2%7D%3B%20T%5Cleft%5B%20%5Cbegin%7Barray%7D%7Bc%7D%20x%20%5C%5C%20y%20%5C%5C%20%5Cend%7Barray%7D%20%5Cright%5D%20%3D%5Cleft%5B%20%5Cbegin%7Barray%7D%7Bc%7D%20%5Cfrac%7Bx-2y%7D%7B5%7D%20%5C%5C%20%5Cfrac%7B-2x%2B4y%7D%7B5%7D%20%5C%5C%20%5Cend%7Barray%7D%20%5Cright%5D%20" \o "TeX). Determine if T is projection on a line, reflection in a line, or rotation through an angle, and find the line or angle.** |
| 3/2 | **Find all values of *a* so that the vector [5, 3, *a*] is in span{[3, 2, 0], [1, 0, 3]}** |
| (i) and (ii) | **Which of the following are subspaces of R2**  **(i) {(x,y): 2x+7y = 0}**  **(ii) {(x,y): y=0}** |
| (ii) only | **Let the set of vectors {u, v, w} in R3 be dependent. Which of the followings are true?**  **(i) w must be a linear combination of u and v.**  **(ii) There exists (a, b, c) with a2+b2+c2 not zero such that a.u + b.v + c.w = 0** |
| 1 | **If we write X = [2 -3 2 7]T as a linear combination of the orthogonal basis of the subspace U = span{[2 -1 0 3]T ; [2 1 -2 -1]T} then the sum of coefficients equals** |
| 2 | **Find the dimension of the null space of the matrix** **[A=\begin{bmatrix}1&2&-1&2&1\\1&2&2&0&1\\2&4&-2&3&1\end{bmatrix}](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=A%3D%5Cbegin%7Bbmatrix%7D1%262%26-1%262%261%5C%5C1%262%262%260%261%5C%5C2%264%26-2%263%261%5Cend%7Bbmatrix%7D)** |
| (i) only | **Let A be a 3 x 5 matrix and let dim(null(A))=2. Which of the following statements are true?**  **(i) All bases of the Col(A) have three vectors.**  **(ii) dim(Row(A)) = 1** |
| 4x+3y+10z=50 | **Find an equation of the plane which contains the point (2, 4, 3) and which is perpendicular to the planes x+2y-z=1, 3x-4y = 2** |
| None of the other choices is correct | **Let Q be the point on the line x = 1+t, y = -2 + 3t, z = 1 - t that is closet to the point P(1,0,1). Find the first coordinate of Q.** |
| (0, 2, 0) | **Let u = (1, 2, 1); v = (2, 3, 0); w = (0, 1, 0). Find projection of u x v on w.** |
| (1/5)[x+2y; -2x-4y] | **Let T be projection on the line y = 2x followed by reflection in the X axis. Find T[x y].** |
| a+b+c = 1 | **Determine whether x = (5, 6) lies in U= span{u=(1, 2); v=(0, 1); w=(2, 3)}. If so, write x = a.u+ b.v +c.w then find a+b+c.** |
| None of the other choices is correct | **Which of the following are subspaces of R3 ?**  **(i) {(x,y,z)| z = 2x+3y+2}**  **(ii) {(x,y,z)| x2+y2=z2}** |
| 2 | **Find the dimension of the subspace U = {[x, y, z, t] | x+4y-z = 0; x-2z+ t= 0}.** |
| {[1, 2, 3]} | **Let U = {[x, y, z]| x - 2y + z = 0, x + y - z = 0}. Which of the following is a basis for U?** |
| None of the other choices is correct | **Which of the following sets are linearly independent?  (i) {[1, 1, 1], [1, 0, 1], [-1, 1, -1]}  (ii) {[1, 2], [3, 4], [-1, -1]}  (iii) {[1, 2, 1], [1, 1, 1], [-1, 0, 0], [0, 0, 1]}** |
| [a = \frac{1}{\sqrt6}](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%20a%20%3D%20%5Cfrac%7B1%7D%7B%5Csqrt6%7D)or [-\frac{1}{\sqrt6}](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=-%5Cfrac%7B1%7D%7B%5Csqrt6%7D%20) | **Find a so that B = {(****[\frac{1}{\sqrt3}, \frac{1}{\sqrt3},\frac{1}{\sqrt3}), (-\frac{1}{\sqrt2},\frac{1}{\sqrt2},0) ,(a,b,c)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%5Cfrac%7B1%7D%7B%5Csqrt3%7D%2C%20%5Cfrac%7B1%7D%7B%5Csqrt3%7D%2C%5Cfrac%7B1%7D%7B%5Csqrt3%7D%29%2C%20%28-%5Cfrac%7B1%7D%7B%5Csqrt2%7D%2C%5Cfrac%7B1%7D%7B%5Csqrt2%7D%2C0%29%20%2C%28a%2Cb%2Cc%29)} is an orthonormal set.** |
| 3 | **Find the dimension of the subspace spanned by the vectors  {[1, 1, 1], [-1, 1, -1], [1, 1, 3], [0, 2, 1]}** |
| dim(row(A) = 4; dim(null(A) = 4 | **Let A be a 10x8 matrix, rank(A) = 4. Find dim(row(A)); dim(null(A)).** |
| (2, -5, -1) | **Which of the vectors below is orthogonal to both (2, 1, -1) and (-3, -2, 4)?** |
| [\frac{\sqrt2}{2}](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%5Cfrac%7B%5Csqrt2%7D%7B2%7D) | **If u = (-2, 1, 1) and v = (1, 0, 1), then || projv (u) || is :** |
| x-3y-2z = -1 | **Find an equation of the plane passing through the point P(1, 0, 1) and containing the line [x, y, z] = [0, 1, -1] +t [2, 0, 1]** |
| [\frac{\pi}{3}](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%5Cfrac%7B%5Cpi%7D%7B3%7D) | **The angle between the planes x – z = 7 and y – z = 234 is** |