Team rationa Roll no: F18MS-38 F18MS-03 F18MS-68 F18MS-18

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$$\begin{array}{l} (INO 1: Show that T: B_{2}[IROC] \rightarrow IR^{3} defined\\ by T(ax^{2}+bx+c) = (a_{1}b_{1}c) is linear\\ Transformation.\\ Preef: let U = a_{1}x^{2}+b_{1}x+c_{1}\\ V = a_{2}x^{2}+b_{2}x+c_{2}\\ Now\\ \alpha U+V = \alpha(a_{1}x^{2}+b_{1}x+c_{1})+(a_{2}x^{2}+b_{2}x+c_{2})\\ T(\alpha U+V) = T((\alpha a_{1}+a_{2})x^{2}+(\alpha b_{1}+b_{2})x+(c_{1}+c_{2}))\\ According to given Condition condition of the inition of t?\\ T(ax^{2}+bx+c) = (a_{1}b_{2}c)\\ = (\alpha a_{1}+a_{2},\alpha b_{1}+b_{2},\alpha c_{1}+c_{2})\\ T(\alpha U+V) = T(\alpha a_{1},\alpha b_{1},\alpha c_{1})+(a_{2},b_{2},c_{2})\\ = \alpha T(a_{1},b_{1},c_{1})+(a_{2},b_{2},c_{2})\\ Aence both the condition are satisfied\\ \end{array}$$

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QNO2: Write the matrix corresponding to linear Transformation in QNO1 with respect -standard basis of P. [Rex] and IR3. As from QNO1 we know that T: P2 [IR(x)] -> IR3 is defined as  $T(ax^{2}+bx+c)=(a,b,c)$ het suppose B and E are standard basis respectively of Pr[R(x)]. B= {(0x2+0x+c), (0x2+bx+c), (ax2+bx+c)} This is standard basis ? 62 ez 01 B= {eisesses} IR'= E= \$(1,0,0), (0,1,0), (0,0,1) }  $T(e_1) = o(1,0,0) + o(0,1,0) + c(0,0,1) = (0,0,c)$ T(e,) = O(1,0,0) + b(0,1,0) + c(0,0,1) = (0, b, c]  $T(e_3) = A(1,0,0) + b(0,1,0) + c(0,0,1) = (a,b,c)$ so the matrix is 0 0 9 0 b b Not correct matrix!

How will you multiply this matrix to a polynomial (vector) instead of applying T?

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Q:3 show that set  $\beta = \{-1, 1+\chi^2, 1+\chi+\chi\}$ is basis of P2 [R(x)]. Proof: To prove whether the set is basis

or not we will prove whether given set is linearly dependent or Independent? if the given set is linearly independent then we are done with it.

then Let a, b, CER

 $= a(-1) + b(1+\chi^{2}) + C(1+\chi+\chi^{2}) = 0$  $= -a + b + bx^{2} + c + cx + cx^{2} = 0$ 

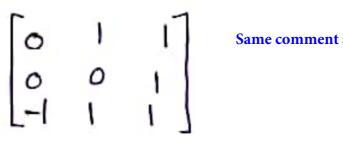
 $=(b+c)x^{2}+(c)x+(-a+b+c)=0$ 

Do these three polynomials 6+0=0 b+C=0 => span the complete basis? C = 0-a+b+c=030 0=0 Remember spanning second condition. a-0-0=0 from above equations it it is clear that  $\alpha = b = c = 0$ so the vectors given in set are linearly independent so given set B is basis of P2 [R(x)]

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is

QNO 4 While the matrix of linear Transfor-  
-mation in QNO1 with respect to basis of  
R. [R(x]] in QNO3 and standard basis of R<sup>3</sup>.  
solution: Is from QNO1 know that  
T: R. [R(x)] 
$$\rightarrow$$
 R<sup>3</sup> defined by  
T<sup>1</sup>(ax<sup>2</sup>+bx+c) = (a,b,c)  
Now the given basis of R. [R(x)] in QNO3 def-  
ined by set B and randard basis of IR<sup>3</sup> by P  
weget  
B = {(0x<sup>2</sup>+0x-1), (x<sup>2</sup>+0x+1), (x<sup>3</sup>+x+1)}  
e<sub>1</sub> e<sub>2</sub> e<sub>3</sub>  
P = {(1,0,0), (0,1,0), (0,0,1)}  
Now  
T(e<sub>1</sub>) = 0(1,0,0) + 0(0,0,1) + 1(0,0,1) = (0,0,-1)  
T(e<sub>2</sub>) = 1(1,0,0) + 1(0,1,0) + 1(0,0,1) = (1,0,1)  
T(e<sub>3</sub>) = 1(1,0,0) + 1(0,1,0) + 1(0,0,1) = (1,1,1)  
so the matrix will be



Same comment as in Q No. 2

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