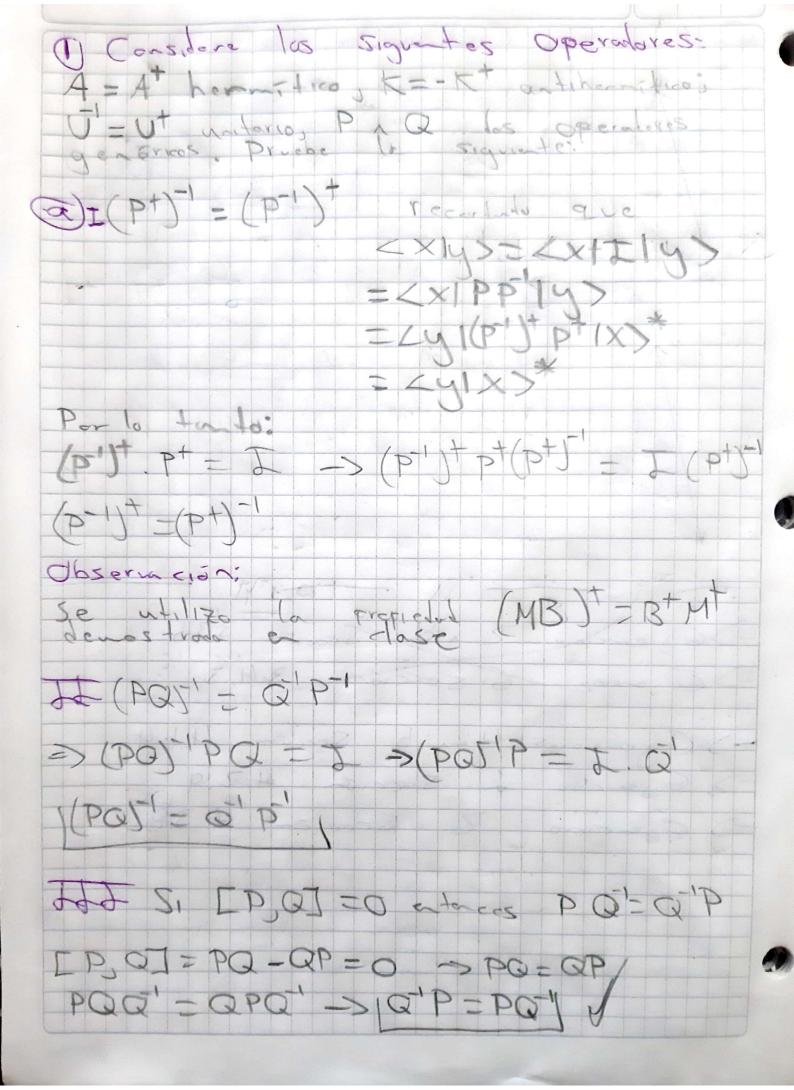
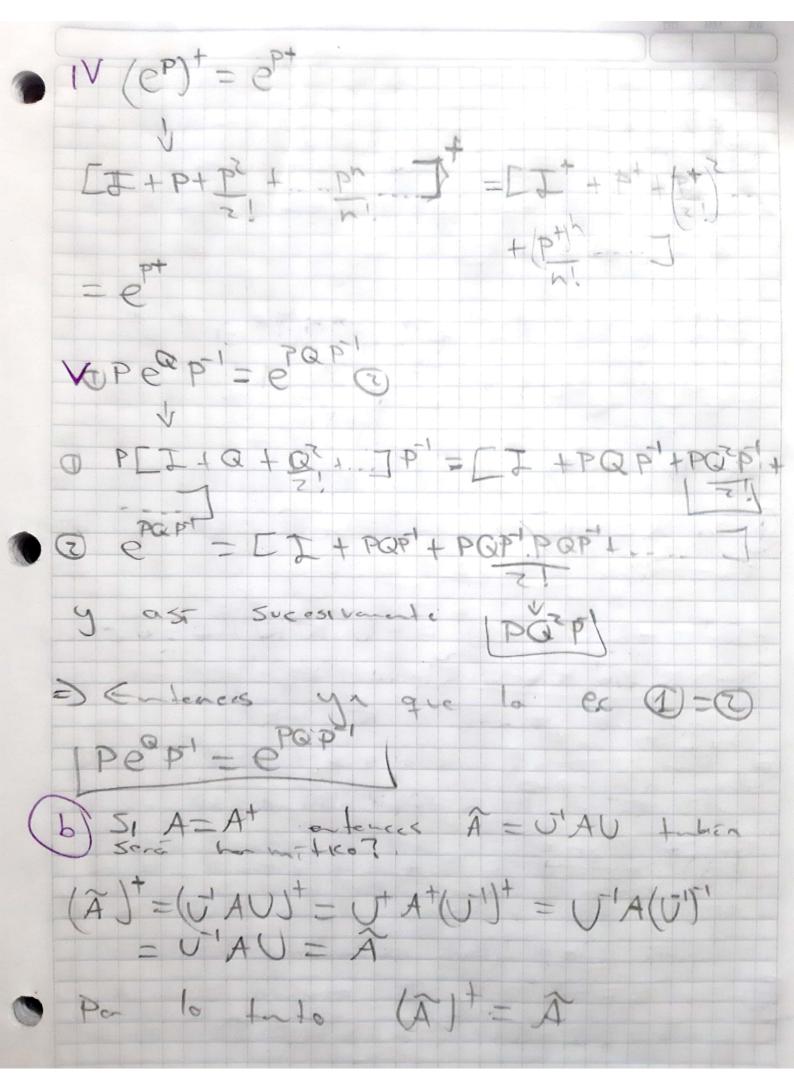
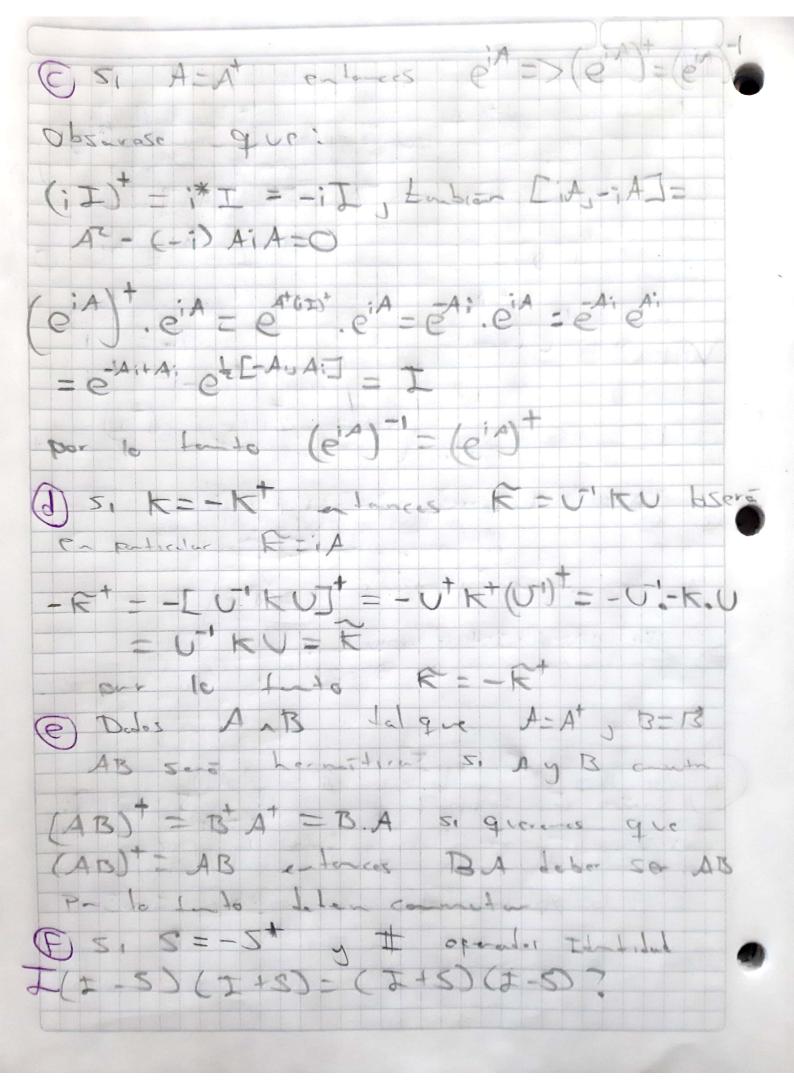
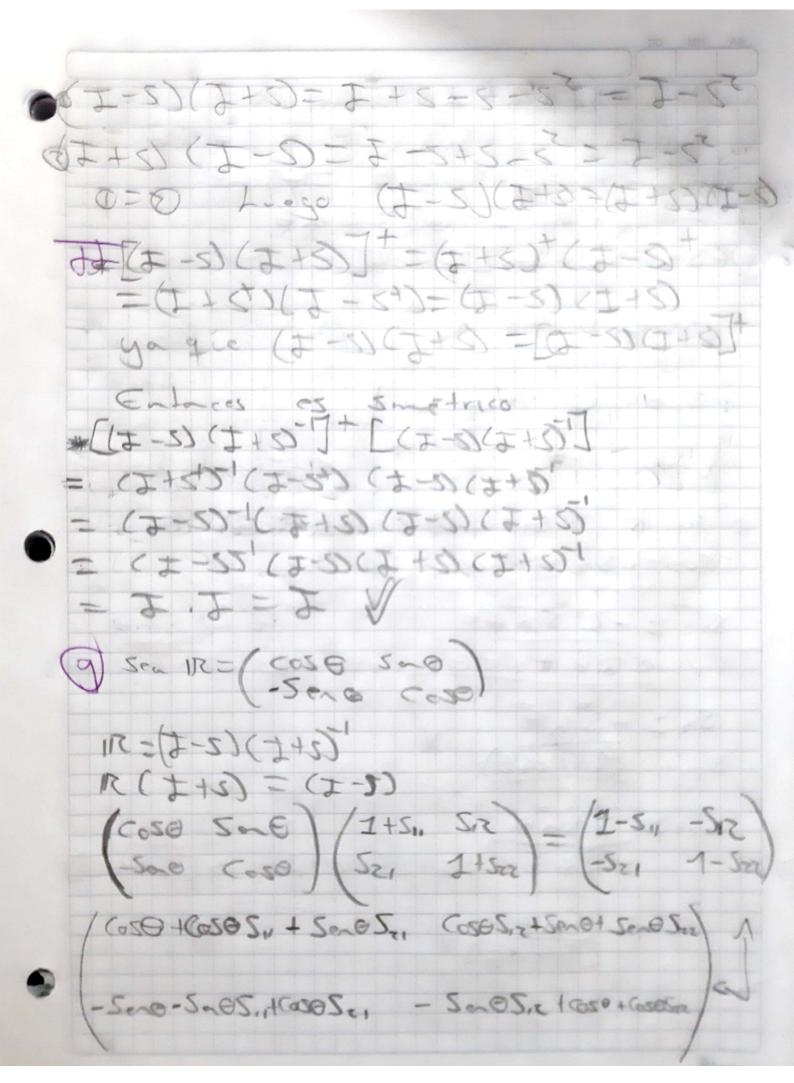
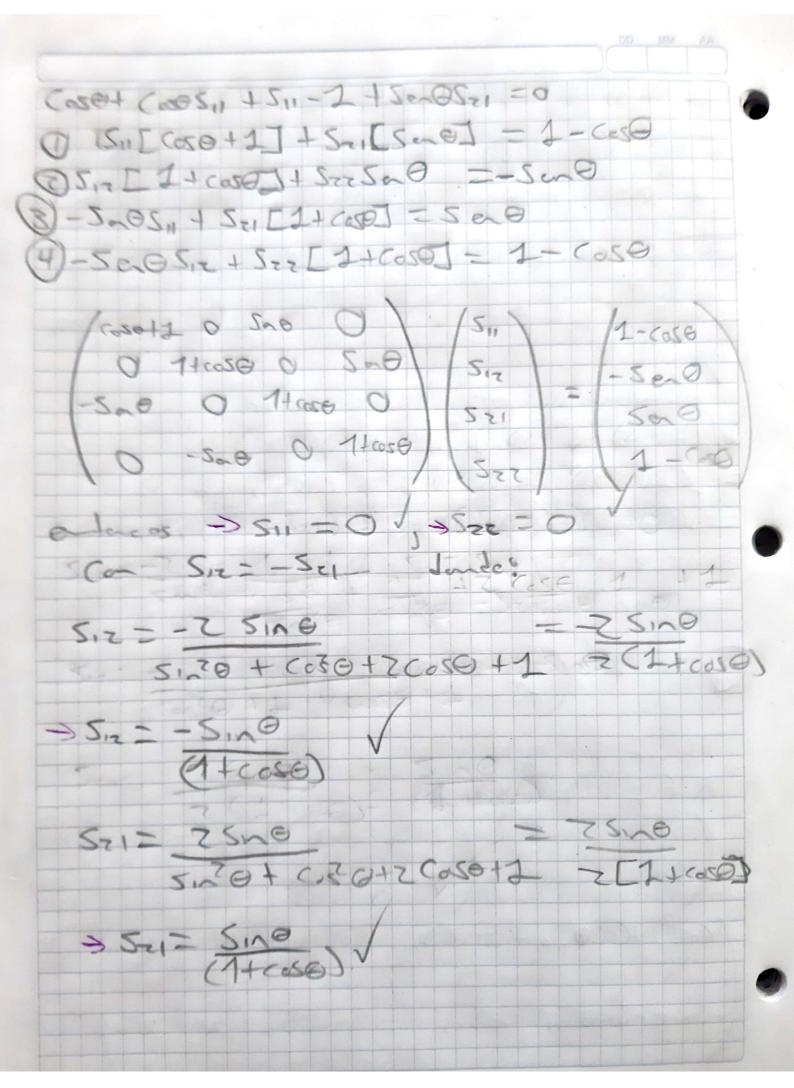
```
A) Suponga que AB = BA. Demuestre que:
    (a) (A+B)^2 = A^2 + 2AB + B^2
    (A+B)^2 = (A+B)(A+B) = AA+AB+BA+BB
                                  = A2 + AB+AB+B2 = A2+ DAB+B2 Rta/
  (b) (A+B)3 = A3+ 3A2B+3AB2+B3
(A+B)3 = (A+B)(A+2AB+B2) = A3+2A2B+AB2+
                                                                                                                    BA2+ 2 BAB + B3
                           = A3 + 2 A2B+ AB2 + A2B+ 2AB2 + B3
                            = A3 + 3 A28 + BAB2 + B3 Rtal.
5) Suponga que un operador L puede ser escrito como la composición de dos operadores L = L - L + con [L -, L + J = II]
    Demostrar que:
     • Si LIX> = \lambdaIX> y 19 = L+ 1X> enfonces L1y> = (2+1)1y>
                                                                           wanda [L-, L+] = I
     Como : 147 = L+1x>:
      L19> = (L_L+) L+1x> = ( I+L+L-) L+1x> = L+1x>+L+L1x>
                       = 197 + L_{+}(21x) = 197 + 2L_{+}(x) = 197 + 2197
                     = (1+2)(y) R+a/
  · Si Lix> = 21x> y 12> = L-1x> enfonces Liz> = (2-1)12>
- LIZ> = (L_L+)(L-IX>) = L-(L+L-) |X> = L-LIX> = \( L - |X > = \( \lambda | 
→ L+L- 1=> = L+ L-L- (X> = (L-L+ - I) L- (X>
                                    = L-L+L-1x>) - IL-1x> = L-L|x> - L-1x>
                                     = L_{-}(\lambda | x \rangle) - | z \rangle = \lambda(L_{-}|x \rangle) - | z \rangle
                                     = \lambda 12 - 12 = (\lambda - 1) 12
```



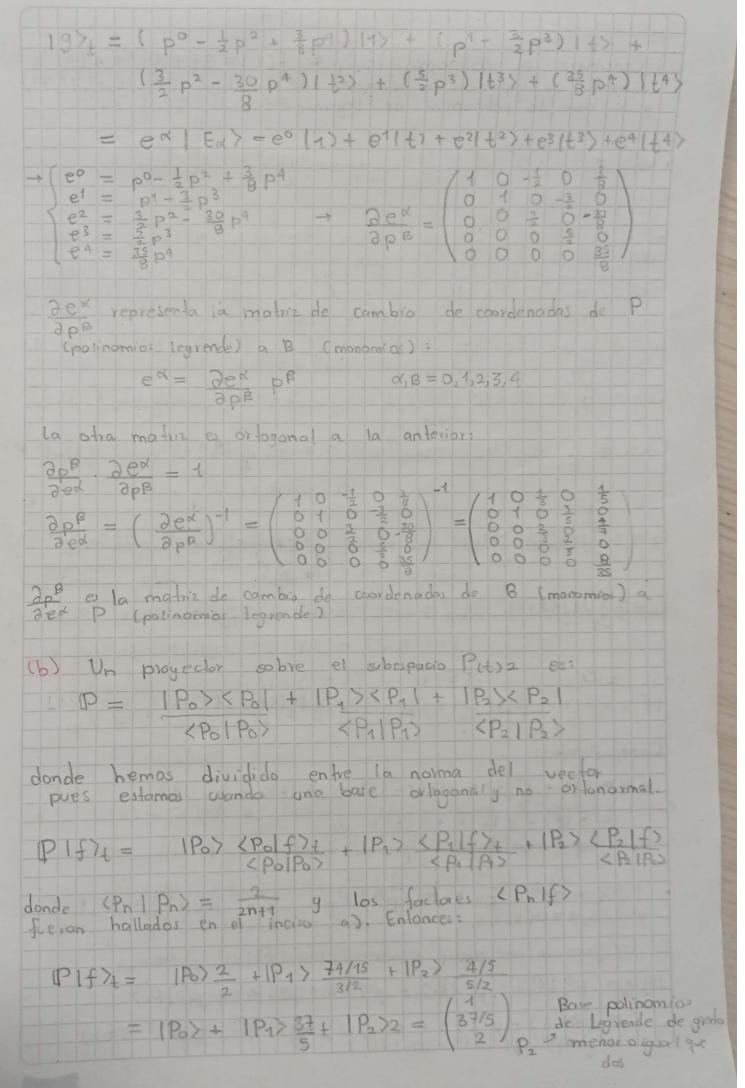


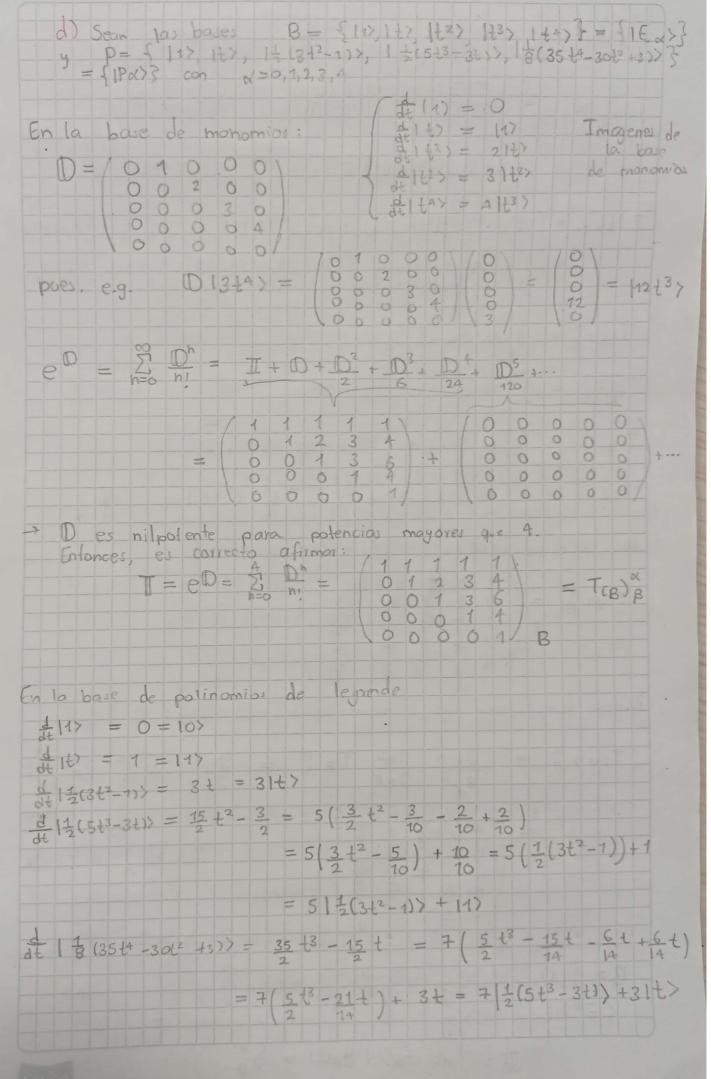


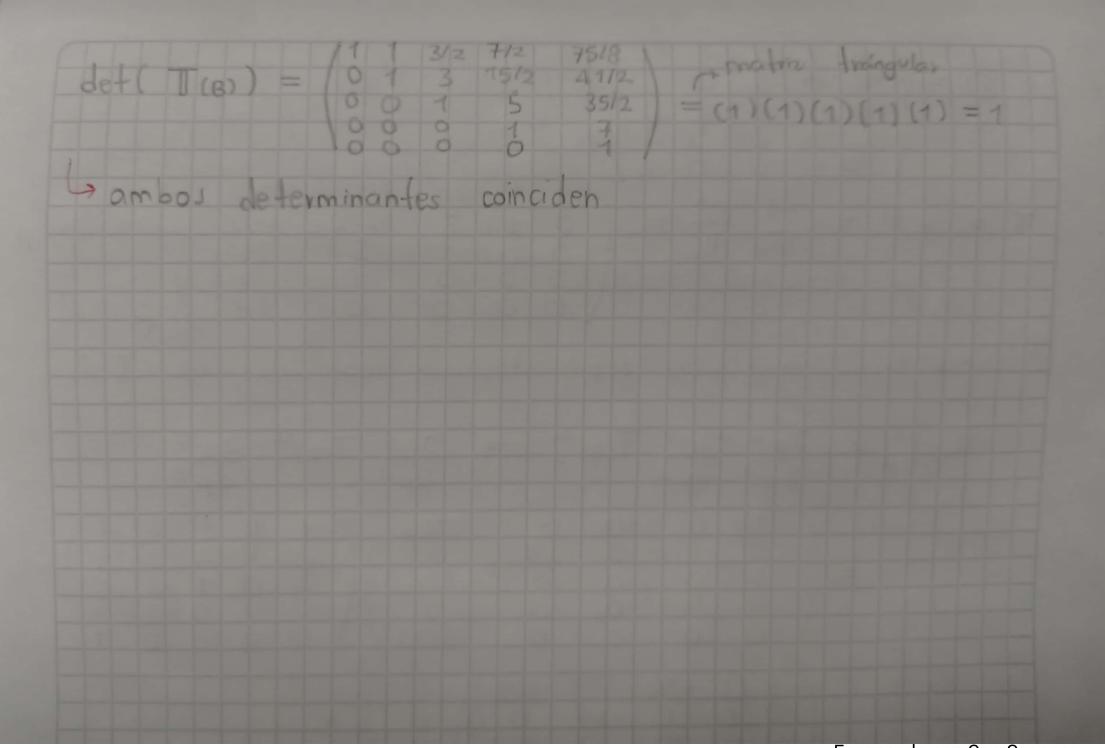




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Sección 4.3.8
2) Considere el polinomio |f\rangle_t \Leftrightarrow f(t) = 5t + 3t^2 + 4t^3 en wenhe su expresión en términor de las bases B=51, t, t², t², t³, t4} y la base de polinomios de Legrende P={Po, P1, P2, P3, P4}
· 1 f 2 = 5 t + 3t2 + 4t3 = 5 | t> + 3 | t2> + 4 | t3> =
= Ahora para la base de legrendo: P= (11>, 1+>, 1=(3+2-1)), 1=(5+3-3+)>, 1=(3+2-1)>,
|f\rangle_{t} = \sum_{n=0}^{\infty} C_{n} |P_{n}\rangle, \quad C_{n} = \int_{0}^{\infty} dt f(t) P_{n}(t) / \left(\int_{0}^{\infty} dt P_{n}(t)\right)
Co = 1 1 dt (5t+3t2+4t3)(1) = 1 [5t2+t3+t4] = 1
C_1 = \frac{3}{2} \int dt (5t + 3t^2 + 4t^3)(t) = \frac{3}{2} \left[ \frac{5}{3}t^3 + \frac{3}{4}t^4 + \frac{4}{5}t^5 \right]_{-1}^{1} = \frac{37}{5}
C2 = \( \frac{5}{2} \) \dt \( \frac{5}{13} \tau^2 + 4\tau^3 \) \( \frac{1}{2} \tau^2 - 1 \) = \( \frac{5}{4} \tau^2 + \frac{5}{5} \tau^5 + \frac{12}{5} \tau^6 - \frac{1}{5} \tau^2 - \tau^3 - \tau^4 \]_{\tau}^2
C_4 = \frac{9}{2} \int dt \left[ 5 t + 3t^2 + 4t^3 \right] \left( \frac{1}{8} \left( 35t^4 - 30t^2 + 5 \right) \right) = \frac{9}{16} \left[ \frac{35}{2} \times 8 + 15 \times 7 + 55 \times 6 - 18 \times 5 \right]
                                                                           -69 X4 + 3 X3 + 15 X2 ] 1
 = 0
|f\rangle_{t} = |1\rangle + \frac{3}{5}|t\rangle + 2|\frac{1}{2}(3t^{2}-1)\rangle + \frac{8}{5}|\frac{1}{2}(5t^{3}-3t)\rangle = \begin{pmatrix} \frac{3}{37}/5 \\ \frac{2}{875} \end{pmatrix}
 Comprobación:
15/t= 11/3 + 37 1t) + 31t27 - 11/3 + 4 1t3> - 24 1t>
          = 5/t>+3/t2> +4/t3> W
· 19/2 = ex | Ex> = pp | Pp> con {| Ex>} = {1, t, t2, t3, t4}
y d, R=0, 1, 2, 3, 4
Si 192 es un polinomio generico de Pitsa, entonces:
 197= po 1Po> + p2 1Pa> + p2 1Pa> + p3 |Pa> + p4 |Pa>
          = p^{0}(1) + p^{1}(t) + p^{2}(\frac{1}{2}(3t^{2}-1)) + p^{3}(\frac{1}{2}(5t^{3}-3t))
+p^{4}(\frac{1}{3}(35t^{4}-30t^{2}+3))
```







P 
$$|f|_1 = |f| + \frac{2}{5}|f| +$$