Want to show: Do LTE, (TE) | 0=0, = VB M(TE) | D=0, proof: LHS = Jo LTG (To) (BO) = Jo [n(To) + & dto (s) & TG (ak) ATO (s, a)] (0=0) = 3 d To (s) & To (als) ATG (s,a) | 0=0, RI-15= Ton(Tho) (0-0) = To [n(Tho) + 3d Tho (s) & Tho (als). A Thois, a)] 10-01 = ZJO[dtos) ZTO(als)ATTO(SIA)]10=0, = 3 Jodins) 3 Tro (als) ATTO (s,a) | 8=01 + 3 0 Tuls) & To Tio (als) A TO" (s.a) 10=0, = Z (To(d To (s)) | == 0. ET(0, (als) ATIOI(s,a)) + 3 [d Tro, (s) ( & TO Tro (als) A Tro, (s,a) | 0=0)] = 3 ( Told Tous) (0=0, [ ] To, (a/s) (QTTO, (S,A) - VTO, (S))] + 30( The (s) ( 2 To (a)s) A The (s,a) (9=0) = } \ \ \ \( \langle \ + 3 d m (s) ( 2 To (a(s) A To (s,a) | 0=01)] = } \[ \delta \delta \left( \text{S} \right) \ \ \text{\ti}\text{\te}\text{\text{\text{\text{\text{\text{\texitex{\text{\text{\texictex{\text{\texi}\text{\text{\texit{\texict{\texit{\texi\texi{\ti = 3 d Ten (s) & To (als) A Ten (s,a) | 0=01

= LHS #.

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(b-1)
 Want to show: HF: S -> R, VT.
                 (1-7) Esyn [f(s)] + Esydin, arte, s'n Pl. 15, a) [7f(s')] - Esydin[f(s)] = D.
  proof:
      Leverege formulation (18) shown in the original paper:

du = (1-8) $\frac{8}{50} (\textit{Fr})^{\text{t}} u = (1-8)(I-8Pa) u
                   (where Price Ristrist denotes the transition matrix w. components Price's)= SP(s'Isa) Tilas)da)
      Multiply both sides of (18) by (I- 7Pi) =
          (II- 8/2) din = (1-8) (I- 8/2) (I-0/2) " M
      1 (1-8) M+ Produ - du =0.
      lake inner product with the vector of ER151:
        (1-8) m.f + Prida of - di.f =0
      Rewrite this vector form into function function:
        (1-7) Esnu [f(s)] + Esnothinamens, suplos, of Plos, a) [of(s')] - Esnoth [f(s)] =0
 Want to show = M(TC) = + Esnotin, antilols) [R(s,0)]
                      = Esm[f(s)] + to Esnaturantisinp(.15,0) [R(s,0)+ of(s')-f(s)]
  proof:
       Divide the result in (b-1) by (1-8):
          Esny [f(s)] + 1-8 Esny, antishplesa) [8fu')]- 1-8 Esny [f(s)]=0
    J.M(T) = To Esida, anticols) [R(s,a)]
             = 1-7 Esadu, antil·15) [R(S,a)] to
             = 1-8 Esidinarile () [R(s,a)] + Esim[fw]+ + 7- Esidinaril siple (s.a) [ofw)]
                                                                    - Fa Esnolin[fls)])
              = Esnutfis)] + 1-8 [Esnoti, anti-is)[RIS,a)] + Esnotimante, superisa, [27615]-Esnotifo])
              = Esnulfu)+ Fo Esnotiniana, shiple 15,9 [R(s,a)+of(s')-f(s)]
```

```
Want to show = V T, T, du - du = g (I-g Pt) (PT- pt) du.
       By definition, du = (1-7) & OPT u
                        = (1-7) (I- opt) u
                   where PT(s'ls)= SP(s'ls,a)T(ab) da=) PT=PTPT+=PTU)
         du+du=(1-8)(I-8PT) n-(1-8)(I-8PT) n
                    = (1-8)[(I-8pt)]-(I-8pt)]M.
         Let G' = (I - \gamma P^{T'})^{-1}, G = (I - \gamma P^{T'})^{-1}, \Delta = P^{T'} - P^{T}

Then G' = G' = (I - \gamma P^{T}) - (I - \gamma P^{T})
          Left multiply by G and night multiply by G',
              G(G'-G')G' = G'-9 = TGDG' = TGDG
       = (du-du=(1-8)[G'-G]u
                  = (1-2) 2G/2G/M
= (+2) T (I-2pt) - (pt-pt) (I-2pt) / M
                  = 7 (I-7 pr) (pr-pr) din +
(1-2)
Want to show = || de - de ||, = = = Esada [DTV (T'(-15)||TL (-15))]
proof:
    Leverage the result in (C-1) =
          11 din-dull, = & 16'sdull, < & 16'11, 11 sdull.
    For the ||G'|| term;
        11G'11 = 1(I- opti) 11 = 1 = 6pti) 11 = 1-8
    For the 11 solull, term:
        11 dull, = 11 (PT'-PT) dull, = 3 / 3 (PT(s'Is) - PT(s'Is)) duls)
                                    < 3 | PT(s'15) - PT(s'15) | dt (s)
                                    = 3, 13 P(s'15,a)(T'(a15) - T(a15)) | das)
                                    ( = P(5' |SA) |T'(915) - TL(915) | dus)
                                    = = [Dru[T(015) - T(015) | dis () = 2 E [Dru[T(015) | T(015))]
```

```
Want to show = n(Ti)-n(T) > - 1 (Yruf(T') - 2 Ef Dr. (d'ill d'is))
      (n,f(T)) := Esida, anti(-18). s'n p(-18,a) [(T(1018) - 1)(R(s,a)+of(s))-f(s))]
       Ef == Max | Earn'(-15), s'apl-15, a) [R(5,a)+ +f(5')-f(5)]
    Let S. (S.a.s') = R(s.a) + T f(s')-f(s),
    By the issuft in (b-2),
        n(T)-n(T) = - [Esrati, antishple 1s,a)[8f(s,asi)] - Esrati, antishple 1s,a)[8f(s,asi)]
    Let If GR. denotes the vector of components In'(s)= Earth(1s), s'ap(-1s,a) [ & (s,a,s')]
        Esnoth, antisty [ of (s,a,s')] = (dn', 5t') = (dn, 5t') + (dt'dn, 5t')
     By Hölder's mequality,
        (dm, 37)+11 dm-dm11 p 1137/11 > Esidii, anti, sip [ &f (s.a,s)]
                                                       > (di, 87) - 11 din-dillo 115 11/9,
        (where P. & ∈[1, M], st. ++==1).
     : | | du - du | = 2 Dru (du | du), and
       11 3+ 11 = Ef, and
       (du, FT) = Esada anti, s'ap (1/5,0) [8f(5,0,5')]
                     = Esnota, ant, s'apl. 15.00 [ The (a/s) of (s,a,s)]..... by importance sampling method.
      -1 m(tr)-n(tr) > + (Yruf(tr)-25% Dru (di 11 din))
```

Would to show = m(TU) - m(TU) > 1-8 Esratu, anti (ols) [AT(sia) - 1-7) (Dru (T(ols)) Tu(ols)) observe that A"(s,a) = Esinp[gyr (s,a,s') |s,a], (d): n(ti)-n(ti) > - (Esnotin, an Ti(-1s), s'n P(-1s, a) [8 f(s, a, s')] - 2 ET Dov(dill)
dis) = 1-8 Esada antil·15) [AT(s,a) - 28 To DTV (du 11 du)] = 1-8 Esada, anti (. 15) [At (s.a) - 2" || di - du || ] ..... 11 du-dull, 5 20 Esadu [ Dru (Ti(.15) | Ti(.15))] => - || da - dall > = Esada [ DTV (Ti'(-15) || Tel-15))] ...... Combining I and I : η (π')-η(π) >, - Esndu, ann'(·16) [A"(s,a) - επ' || d" - d" || ] => 1-8 Esnotin, anti(ols) [AT(s,a) - 26to (DTV(T('015)||T(-15)))]

Want to show = D(A, V) := min { - gT(0-00) + VT(c+BT(0-00)) + A (±(0-0x) H(0-0x) - g = = = (gTHTg-2gTHTBV+VBTHTBV)+VC-70 proof: The dual problem of (OPT) is: max D(A, V). max D(2,2) = max min (-g (0-00)+v (c+B (0-00))+ = (6-04) H(0-02)- 5)} = max min ( \frac{2}{2}(\theta - \theta\_k)^T H(\theta - \theta\_k) + (-\text{g} + \tilde{z} \text{B}) (\theta - \theta\_0) + (\text{v} \tau - \frac{2}{2} \text{s}) \} let 1/30-0k = x + = x + i'(g-BV). by solving \( \tau \L(\lambda, \lambda \right) = 0 max D(7,2) = mox {= (g-B0) H'(g-B2) - (g-2B) = H'(g-B2) + (2-35)} = max = (g-BW) + (v( - 25) = max -1 (gTHTg-2gTHTBV+VTBTHTBV) + VTC-25

-1. D(2, V) = -1/2 (gTH'g-2gTH'BV+D'BTH'BV)+D'C- 30