RULES OF THUMB

TAS Vs IAS (TAS < 300Kts)
TAS = IAS + 8% / 5000 feet
TAS = (FL X 2 / 1000 + 1) X IAS

Density Altitude
DA = QNE Alt +/- 200 x 10°C △ T (ISA)

True Altitude
TA = QNH Alt +/- 100 X 10°C △ T (ISA)
TA = QNH Alt + (1+ 0.02 / 5°C △ T (ISA)

Ram rise
TAT (^K) = SAT (^K) X (1+0.2M²)
TAT = OAT + (TAS / 100)²
SAT = TAT - (Mach nr - 0.5 ) X 100
Above FL280:
SAT = -(TAT + Mach nr X 30)

Gradients
3° = 5 %
Rate (feet/min) = Gradient (ft/NM) X GS (NM/min)
Rate (feet/min) = Slope (°) X Mach nr X 1000
1° = 100 ft / NM
1% = 60 ft / NM
Slope (°) / 0.6 = Slope (%)
FL X 3 = Distance out (NM) for 3° Slope

Visibility Required
VIS (m) = DH (feet) X 6 for 3° Slope
VDP(NM) = DH (feet) X 3 for 3° Slope

Specific Range
SR = GS / FF
SR lrc = 0.99 SR mrc
V lrc = 1.05 to 1.08 V mrc

Nautical Airmiles
NAM = NGM X TAS / GS
NAM = NGM X TAS / (TAS+WindComponent)

B737-300:
Vy (KIAS) = Actual mass + 220
DME Arc joining at 90° intercept:
Lead distance = GS (kts) / 100 or Mach nr - 0.2
DME Arc leaving at 90° intercept:
Lead angle = GS (KIAS) X 0.6 / DME (NM)
- At 60°: intercept: lead angle X 2/3
- At 45°: intercept: lead angle X 1/2
- At 30° intercept: lead angle X 1/3

Engine Thrust related to % N1:
F = Cst X N exp 3.5
- Flat rate F= 23500 kLbs N= 27.72 10 exp 4

GA N1
GA N1 @ SL & 15°C = 93.7%
△ N1 / △ T = + 0.8% / 5°C
△ N1 / △ Alt = + 0.5% / 1000 feet
FL330 ISA △ -51°C
M 0.76 △ 441 KTAS
△ T / △ TAS = 1
1°C △ 1 KTAS or 2 KTAS / 1000 feet
△ M0.01 = 6 KTAS

B737-300/400 General Info
1. Takeoff
   - Tire (225 MPH) press Nose 165 psi Main 195 psi
   A. Antiskid INOP:
      - MTOM (field/obstacle) - 7800 Kg
      - V1-27 Kts (Flth 6000’) V1-12 Kts (Flth 14000’)
      - V1 >= Vmcg
   B. Assumed Temp:
      - Max 25% Thrust Reduction (see Weight book)
   C. Climb Gradient:
      - SID = 3.3%
      - Missed Approach = 2.5% (CATII, CATIII)
      - Approach Climb = 2.1%
      - Landing Climb = 3.2%
      - Climb Limit = min 2.4 % Single Engine + 1% per 4 tons below MTOM Climb limit.
      - Climb gradient 2 engine = Climb limit X 5
      - ROC (ft/min) = gradient (%) X GS (kts)

2. Climb:
   - Reduced climb 1 = N1 - 3% = Thrust - 10%
     2 = N1 - 6% = Thrust - 20%
   - Speed:
     Econ speed see Cost Index
     Max Rate = +/- Econ - 20 kts 280 kts at 50 tons 315 kts at 68 tons
     Max Angle = flaps up Maneuvring speed
     One engine = max angle with MCT

3. Cruise:
   - LRC gives best buffet margin
   - Fuel:
     - 3200 kg / 1st hour 2300kg / 2nd hour for LM 48 tons
     - 2000 ft above or below optimum alt = 1% penalty
     - 4000 ft below optimum alt = 4% penalty
     - LRC at optimum alt = M0.74 for B737/300
     - + 90 kg/hr for engine anti-ice
     - + 250 kg/hr for engine + wing anti-ice
     - Trip fuel - 0.5% / 450kg below LM
     - ALT fuel minimum 800 kg + holding for B737/300
     - One engine: Drift down level-off ALT - 3000 ft for LRC

4. Deceleration:
   - 3NM to decelerate from 290 to 250 kts
   - 3NM to decelerate from 250 to 210 kts
   - -20 % with speedbrakes

5. Holding:
   - Holding speed on the HOLD page
   - Best speed is flaps up maneuvering speed.
   - Check for max holding speed (Jeppessen)
   - proper timing on the inbound leg.
   - Holding fuel mim 1200 kg for B737/300

6. Enroute descent:
   - 3NM/1000 ft and + 2 NM/10kts TWC and + 1NM/1000ft at 45% N1
   - 5.5% ECON descent at 48 tons
   - 10% clean at Vmo

Gear down or speedbrakes at 250 kts
Gear down and F 15 at 150 kts
- Target 10000 ft AAL at 30NM/250 kts
- Speed brake: - Recommended to hold hand on speedbrake.
- avoid with flaps to avoid buffeting.
- Do not use lower than 1000 AAL
- Low Drag Approach:
  - FL100 30NM @ 300 KIAS
  - FL070 27NM @ 300 KIAS
  - 5000’ 22NM @ 300 KIAS or 5000’ 19NM @ 250KIAS
  - 3000’ 9NM @ 190-220 KIAS (on profile)
  - 1500’ GD/F15 @ 150KIAS

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