B747LatValues produces structures containing values from the book

B747LatValues takes the lateral non-dimensional and dimensional derivatives from the book (pg. 187, 188) and puts them into structures.

```
function [] = B747LatValues()
```

Declare globals, constants, and conversions

```
global Constants Conv DStabDer nDLatDer fConds

Constants.g = 9.81; % [m/s^2]
% Constants.XDe = -3.818*10^-6; % non-dimensional elevator derivative for X
% Constants.ZDe = -0.3648; % Non-dimensional elevator derivatice for Z
% Constants.MDe = -1.444; % Non-dimensional elevator derivative for M

Conv.FtToM          = 0.3048; % ft to m
Conv.LbToN          = 4.44822; % lb to N
Conv.SlugFt2ToKgM2  = 1.35581795; % slug*ft^2 to kg*m^2
Conv.SlugFt3ToKgM3  = 515.2381961366; % slug*ft^3 to kg*m^3
Conv.DegToRad       = pi / 180; % deg to rad
```

Values from page 165, Section 6.2

```
fConds.Alt      = 40000          * Conv.FtToM;         % Altitude of 747 in meters
fConds.b        = 195.7          * Conv.FtToM;         % Wing span in meters
fConds.cBar     = 27.31          * Conv.FtToM;         % Mean Aerodynamics Chord length in mete
fConds.CD0      = 0.0430;                              % Zero-lift Coefficient of Drag
fConds.CL0      = 0.654;                               % Zero-lift Coefficient of Lift
fConds.Ix       = 0.183  * 10^8  * Conv.SlugFt2ToKgM2; % Moment of Inertia about x axis
fConds.Iy       = 0.331  * 10^8  * Conv.SlugFt2ToKgM2; % Moment of Inertia about y axis
fConds.Iz       = 0.497  * 10^8  * Conv.SlugFt2ToKgM2; % Moment of Inertia about z axis
fConds.Izx      = -0.156 * 10^7  * Conv.SlugFt2ToKgM2; % Product of Inertia about z and x axes
fConds.M        = 0.8;                                 % Mach number
fConds.rho      = 0.0005909      * Conv.SlugFt3ToKgM3; % Density of the air in Kg/m^3
fConds.S        = 5500           * (Conv.FtToM)^2;     % Wing Span of 747 in m^2
fConds.theta0   = 0;                                   % Theta naught
fConds.u0       = 774            * Conv.FtToM;         % Velocity in [m/s]
fConds.W        = 6.366  * 10^5  * Conv.LbToN;         % Weight of the 747 in Newtons
fConds.m        = fConds.W       / Constants.g;        % Mass of the 747
fConds.Xi       = -6.8           * Conv.DegToRad;      % Angle between stability and body frame
```

Nondimensional Lateral Derivatives for Boeing 747

```
% Non-dimensional Lateral Derivatives for Beta
nDLatDer.Beta.Cy = -0.8771; % Derivative of the dimensionless Y-force coefficient
                            % wrt sideslip angle Beta
nDLatDer.Beta.Cl = -0.2797; % Derivative of the dimensionless L-moment coefficient
                            % wrt sideslip angle Beta
nDLatDer.Beta.Cn = 0.1946;  % Derivative of the dimensionless N-moment coefficient
                            % wrt sideslip angle Beta

% Non-Dimensional Lateral Derivatives for p-hat
```

```
nDLatDer.pHat.Cy = 0;        % Derivative of the dimensionless Y-force coefficient
                               % wrt p-hat
nDLatDer.pHat.Cl = -0.3295;  % Derivative of the dimensionless L-moment coefficient
                               % wrt p-hat
nDLatDer.pHat.Cn = -0.04073; % Derivative of the dimensionless N-moment coefficient
                               % wrt p-hat

% Non-Dimensional Lateral Derivatives for r-hat
nDLatDer.rHat.Cy = 0;       % Derivative of the dimensionless Y-force coefficient
                              % wrt r-hat
nDLatDer.rHat.Cl = 0.304;   % Derivative of the dimensionless L-moment coefficient
                              % wrt r-hat
nDLatDer.rHat.Cn = -0.2734; % Derivative of the dimensionless N-moment coefficient
                              % wrt r-hat
```

Verified Dimensional Stability Derivatives for Boeing 747 in SI Units

```
% Dimensional Lateral Derivatives for v
DStabDer.v.Y = -1.610 * 10^4; % Derivative of the Y-force wrt sideslip angle Beta
DStabDer.v.L = -3.062 * 10^5; % Derivative of the L-moment wrt sideslip angle Beta
DStabDer.v.N = 2.131 * 10^5;  % Derivative of the N-moment wrt sideslip angle Beta

% Dimensional Lateral Derivatives for p
DStabDer.p.Y = 0;                % Derivative of the Y-force wrt p
DStabDer.p.L = -1.076 * 10^7;    % Derivative of the L-moment wrt p
DStabDer.p.N = -1.330 * 10^6;    % Derivative of the N-moment wrt p

% Dimensional Lateral Derivatives for r
DStabDer.r.Y = 0;                % Derivative of the Y-force wrt r
DStabDer.r.L = 9.925 * 10^6;     % Derivative of the L-moment wrt r
DStabDer.r.N = -8.934 * 10^6;    % Derivative of the N-moment wrt r
end
```