

(*---- Coordinate Limit Force Calcs ----*)

(*from Hebrank 1982*)

Solve[Log[M] == 0.19 θ - 0.836, M]

{ {M \rightarrow 0.433441 $e^{0.19 \theta}$ } }

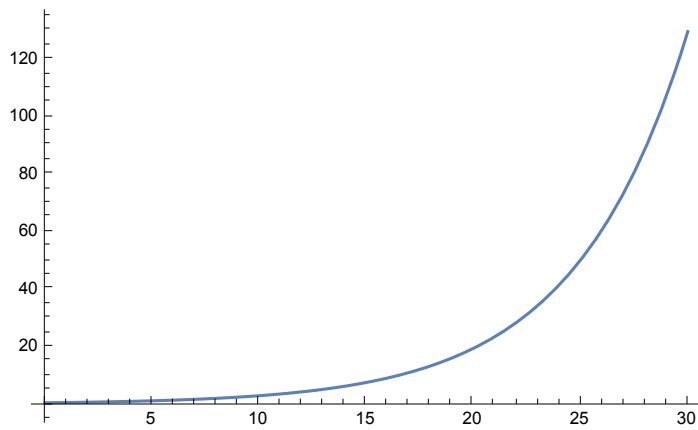
Simplify[$E^{0.19 \theta - 0.836}$]

0.433441 $e^{0.19 \theta}$

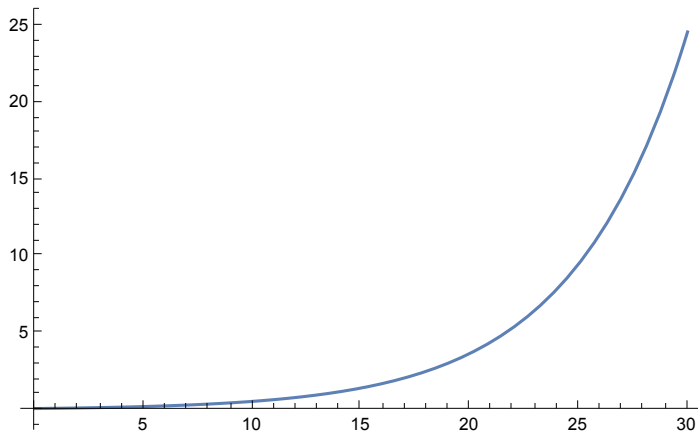
In[57]:= $M = E^{0.19 \theta - 0.836},$

$dM = D[M, \theta];$

Plot[M, { θ , 0, 30}]



Plot[dM, { θ , 0, 30}]



(*---- Model Param Calcs ----*)

In[59]:= $30 * \text{Pi} / 180.$

Out[59]= 0.523599

$0.1 * 0.1^2$

0.001

(*---- Frequency Calcs ----*)

(* Impulse a=0 *)

In[56]:= $T = 0.125; (*s*)$
 $f = 1 / T$

Out[56]= 8.

(* Torsional dT/dθ *)

In[75]:= $k1 = (3.5 - -2.75) / (20 \text{ Degree}); (*Nm/rad*)$
 $m = 0.1; (*kg*)$
 $r = 0.1; (*m*)$
 $Iy = m * r^2; (*N m^2*)$
 $wn1 = \sqrt{k1 / Iy} (*rad/s*)$
 $wn1 / \text{Degree} / 360 (*Hz*)$

Out[75]= 133.809

Out[76]= 21.2964

In[87]:= $k05 = (2.75 - -1.5) / (20 \text{ Degree}); (*Nm/rad*)$
 $wn05 = \sqrt{k05 / Iy} (*rad/s*)$
 $wn05 / \text{Degree} / 360 (*Hz*)$

Out[87]= 110.342

Out[88]= 17.5615

In[83]:= $k0 = (0.75 - -0.6) / (20 \text{ Degree}); (*Nm/rad*)$
 $wn0 = \sqrt{k0 / Iy} (*rad/s*)$
 $wn0 / \text{Degree} / 360 (*Hz*)$

Out[83]= 62.1889

Out[84]= 9.89768

(*---- Tuna Speeds From Papers ----*)

$100. (*km/day*) * 1000 (*m/km*) / (24 * 3600) (*sec/day*)$

1.15741