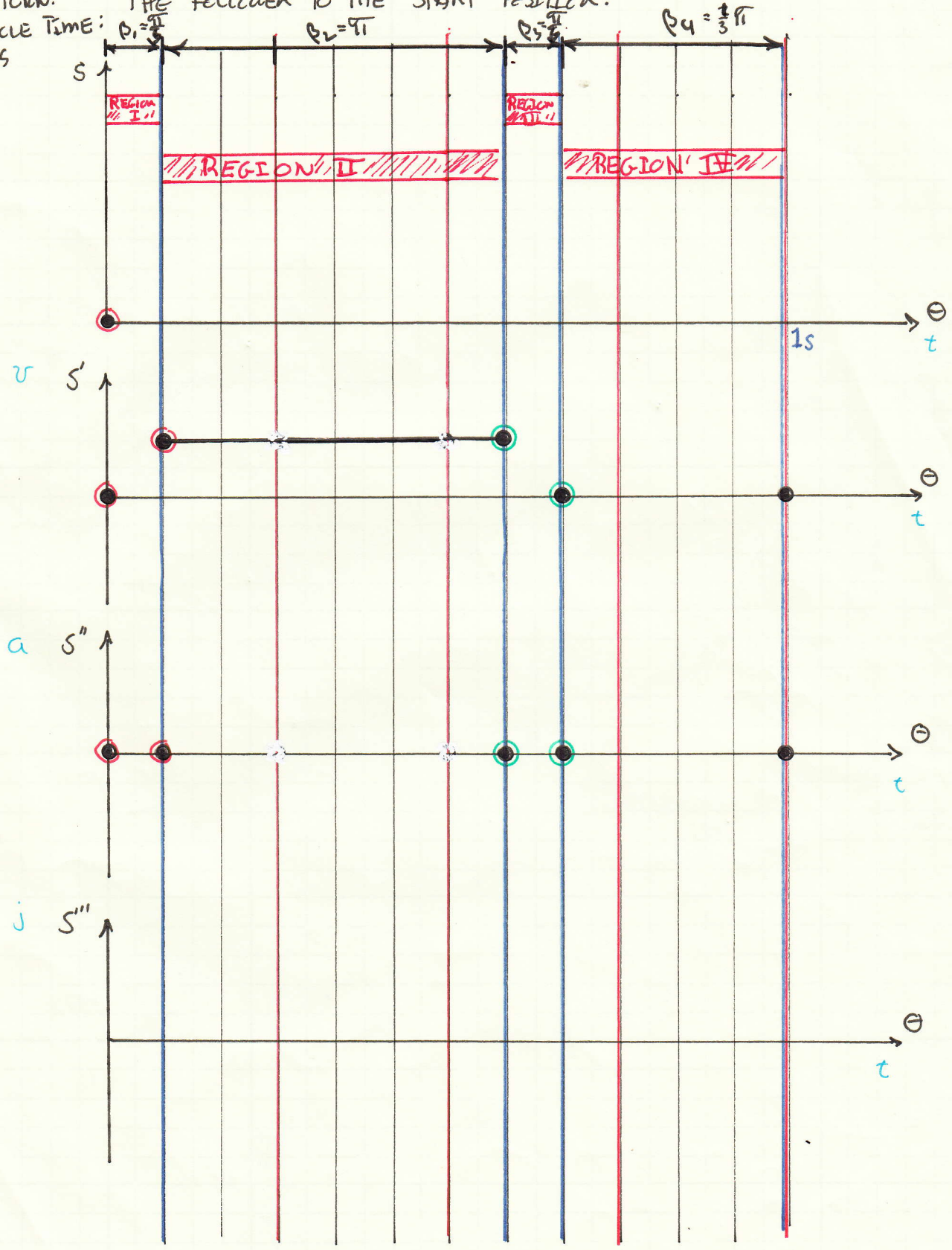
ACCELERATE: THE FOLLOWER TO 10 in/s
MAINTAIN: a CONSTANT VELOCITY OF 10 in/s FOR 0.5 s
DECELERATE: THE FOLLOWER TO ZERO VELOCITY
RETURN: THE FOLLOWER TO THE START POSITION.
CYCLE TIME: 1s



$$\omega = \frac{1\ \text{rev}}{\text{sec}} \cdot \frac{2\pi\ \text{rad}}{\text{rev}} = \underline{\underline{2\pi\ \frac{\text{rad}}{\text{s}}}} \qquad (1)$$

$$\theta = \omega \cdot t \qquad (2)$$

$$s = h \qquad (3)$$

$$v = \dot{s} = \frac{ds}{dt} = \frac{\partial s}{\partial \theta} \cdot \frac{d\theta}{dt} = \frac{\partial s}{\partial \theta} \cdot \omega = s' \cdot \omega \quad \Rightarrow \quad \underline{\underline{s' = \frac{\dot{s}}{\omega}}} \qquad (4)$$

$$a = \ddot{s} = \frac{d^2 s}{dt^2} = \frac{dv}{dt} = \frac{d\dot{s}}{dt} = \frac{d}{dt}(s' \cdot \omega) = \frac{ds'}{dt} \cdot \omega = \frac{\partial s'}{\partial \theta} \frac{\partial \theta}{\partial t} \cdot \omega$$

$$= s'' \cdot \omega^2 \quad \Rightarrow \quad \underline{\underline{s'' = \frac{a}{\omega^2}}} \qquad (5)$$

$$j = \dddot{s} = \frac{d^3 s}{dt^3} = \frac{da}{dt} = \frac{d^2 v}{dt^2} = \frac{d^3 s}{dt^3} = \frac{d(s'' \cdot \omega^2)}{dt} = \frac{ds''}{dt} \cdot \omega^2 = \frac{\partial s''}{\partial \theta} \cdot \frac{d\theta}{dt} \cdot \omega^2$$

$$= s''' \cdot \omega^3 \quad \Rightarrow \quad \underline{\underline{s''' = \frac{j}{\omega^3}}} \qquad (6)$$

IN REGION I: $0 \le \theta \le \beta_1 = \pi/3 = 60^\circ$, $0 \le \theta_1 \le \pi/3$

THE BOUNDARY CONDITIONS FOR THIS REGION ARE

$\theta_1 = 0$: $s = 0$ (7), $v = 0$ (8), $a = 0$ (9)

$\theta_1 = \pi/6$: $v = 10\frac{\text{in}}{\text{s}} \cdot \frac{1}{2\pi\ \frac{\text{rad}}{\text{s}}} = \frac{5}{\pi}\ \frac{\text{in}}{\text{rad}}$ (10) $\quad a = 0\ \frac{\text{in}}{\text{rad}^2}$ (11)

THE FIVE BOUNDARY CONDITIONS WILL REQUIRE FIVE CONSTANTS

$$s_1 = \underbrace{C_0}_{\text{From (7), } 0} + C_1\left(\frac{\theta_1}{\beta_1}\right) + \underbrace{C_2}_{\text{From (8), } 0}\left(\frac{\theta_1}{\beta_1}\right)^2 + C_3\left(\frac{\theta_1}{\beta_1}\right)^3 + C_4\left(\frac{\theta_1}{\beta_1}\right)^4 \qquad (12)$$

$$v_1 = \frac{C_1}{\beta_1} + \frac{2 \cdot \underbrace{C_2}_{\text{From (9), } 0}}{\beta_1}\left(\frac{\theta_1}{\beta_1}\right) + \frac{3 \cdot C_3}{\beta_1}\left(\frac{\theta_1}{\beta_1}\right)^2 + \frac{4\,C_4}{\beta_1}\left(\frac{\theta_1}{\beta_1}\right)^3 \qquad (13)$$

$$a_1 = \frac{2 \cdot C_2}{\beta_1^2} + 6\,\frac{C_3}{\beta_1^2}\left(\frac{\theta_1}{\beta_1}\right) + 12\,\frac{C_4}{\beta_1^2}\left(\frac{\theta_1}{\beta_1}\right)^2 \qquad (14)$$

$$j_1 = \frac{6 \cdot C_3}{\beta_1^3} + 24\,\frac{C_4}{\beta_1^3}\left(\frac{\theta_1}{\beta_1}\right) \qquad (15)$$

$$s_1 = C_3 \cdot \left(\frac{\theta_1}{\beta_1}\right)^3 + C_4 \left(\frac{\theta_1}{\beta_1}\right)^4 \quad (12)$$

$$v_1 = \frac{3 \cdot C_3}{\beta_1} \cdot \left(\frac{\theta_1}{\beta_1}\right)^2 + \frac{4 \cdot C_4}{\beta_1} \left(\frac{\theta_1}{\beta_1}\right)^3 \quad (13)$$

$$a_1 = \frac{6 \cdot C_3}{\beta_1^2} \cdot \left(\frac{\theta_1}{\beta_1}\right) + 12 \frac{C_4}{\beta_1^2} \left(\frac{\theta_1}{\beta_1}\right)^2 \quad (14)$$

$$j = \frac{6 \cdot C_3}{\beta_1^3} + \frac{24 \cdot C_4}{\beta_1^3} \left(\frac{\theta_1}{\beta_1}\right) \quad (15)$$

SUBSTITUTING IN THE REMAINING ACCELERATION BOUNDARY CONDITION

$$a\left(\frac{\pi}{3}\right) = 0 \frac{in}{rad^2} = \frac{6 \cdot C_3}{\beta_1^2} + 12 \frac{C_4}{\beta_1^2}$$

$$\Rightarrow C_3 = -\frac{12}{6} C_4 = -2 \cdot C_4 \quad (16)$$

SUBSTITUTING THE REMAINING VELOCITY BOUNDARY CONDITION

$$v\left(\frac{\pi}{3}\right) = \frac{5}{\pi} \frac{in}{rad} = -\frac{3 \cdot 2 \cdot C_4}{\pi/3} + \frac{4 \cdot C_4}{\pi/3} = -\frac{2 \cdot C_4}{\pi/3}$$

$$\Rightarrow C_4 = -\frac{5}{6} in \quad (17)$$

$$\Rightarrow C_3 = \frac{10}{6} in = \frac{5}{3} in \quad (18)$$

REWRITING THE FUNCTIONS

$$s_1 = \frac{5}{3} in \left(\frac{\theta_1}{\beta_1}\right)^3 - \frac{5}{6} in \left(\frac{\theta_1}{\beta_1}\right)^4 \quad (19)$$

$$v_1 = \frac{3 \cdot \frac{5}{3} in}{\pi/3} \left(\frac{\theta_1}{\beta_1}\right)^2 - \frac{4 \cdot \frac{5}{6} in}{\pi/3} \left(\frac{\theta_1}{\beta_1}\right)^3 = \frac{15}{\pi} in \left(\frac{\theta_1}{\beta_1}\right)^2 - \frac{10}{\pi} in \left(\frac{\theta_1}{\beta_1}\right)^3 \quad (20)$$

$$a_1 = \frac{6 \cdot \frac{5}{3} in}{\pi^2/9} \cdot \left(\frac{\theta_1}{\beta_1}\right) - \frac{12 \frac{5}{6} in}{\pi^2/9} \left(\frac{\theta_1}{\beta_1}\right)^2 = \frac{90}{\pi^2} in \left(\frac{\theta_1}{\beta_1}\right) - \frac{90}{\pi^2} in \left(\frac{\theta_1}{\beta_1}\right)^2 \quad (21)$$

$$j_1 = \frac{6 \cdot \frac{5}{3} in}{\pi^3/27} - \frac{24 \frac{5}{6} in}{\pi^3/27} \left(\frac{\theta_1}{\beta_1}\right) = \frac{270}{\pi^3} in - \frac{540 in}{\pi^3} \left(\frac{\theta_1}{\beta_1}\right) \quad (22)$$

CHECKING THE VALUES OF (19) - (22) AT $\theta_1 = 0$

$$s_1(0) = 0 \qquad a_1(0) = C$$

$$v_1(0) = 0 \qquad j_1(0) = \frac{27C}{\pi^3}\ \text{in}$$

CHECKING THE VALUES AT $\theta_1 = \pi/3$

$$s(\pi/3) = \frac{5}{3}\text{in} - \frac{5}{6}\text{in} = \frac{5}{6}\text{in} \quad (23)$$

$$v(\pi/3) = \frac{15}{\pi}\text{in} - \frac{10}{\pi}\text{in} = \frac{5}{\pi}\text{in} \quad \text{(THIS IS THE BC)} \quad (24)$$

$$a(\pi/3) = 0 \quad (25)$$

$$j(\pi/3) = \frac{27C}{\pi^3}\ \text{in}$$

(23), (24) AND (25) ESTABLISH BC FOR THE NEXT REGION

IN THE NEXT REGION IT IS DESIRED TO MAINTAIN A CONSTANT VELOCITY OF $\frac{5}{\pi}$ in. IF THE VELOCITY IS CONSTANT THEN THE DISPLACEMENT IS LINEAR. THUS THE POLYNOMIAL FUNCTIONS THAT MAKE UP REGION 2 ARE

REGION 2: $\pi/3 \le \theta \le 4\pi/3$, $0 \le \theta_2 \le \pi$, $\beta_2 = \pi$

$$s_2 = C_0 + C_1\left(\frac{\theta_2}{\beta_2}\right) \quad (26)$$

$$v_2 = \frac{C_1}{\beta_2} \quad (27)$$

$$a = 0 \quad (28)$$

$$j = 0 \quad (29)$$

THE BOUNDARY CONDITIONS FOR THIS REGION ARE

$$s_2(0) = \frac{5}{6}\text{in} \quad (30)$$

$$v_2(0) = \frac{5}{\pi}\text{in} \quad (31)$$

$a_2(0) = 0$ IS IDENTICALLY SATISFIED BY (28)

SUBSTITUTING (31) INTO (27)

$$v(0) = \frac{5}{\pi}\text{in} = \frac{C_1}{\pi} \Rightarrow \underline{C_1 = 5\text{in}} \quad (32)$$

SUBSTITUTING (32) AND (30) INTO (26)

$$\underline{s(0) = \frac{5}{6}\text{in} = C_0} \quad (33)$$

(26) - (29) CAN NOW BE REWRITTEN

$$s_2 = \frac{5}{6}in + S_{in}\left(\frac{\theta_2}{\pi}\right) \quad (26)$$

$$v_2 = \frac{S_{in}}{\pi} \quad (27)$$

$$a_2 = c$$

$$j = 0$$

NOW CONSIDER ~~THESE~~ THE VALUES OF THESE FUNCTIONS AT $\theta_2 = 0$

$$s_2(0) = \frac{5}{6}in + \frac{S_{in}}{\pi}(0) = \frac{5}{6}in$$

$$v(0) = \frac{S_{in}}{\pi}$$

$$a(0) = c$$

$$j(0) = 0$$

NOW CONSIDER THE VALUES OF THESE FUNCTIONS AT $\theta_2 = \pi$

$$s_2(\pi) = \frac{5}{6}in + S_{in} = \frac{35}{6}in \quad (28)$$

$$v_2(\pi) = \frac{S_{in}}{\pi} \quad (29)$$

$$a_2 = 0$$

$$j_2 = 0$$

(28) AND (29) ARE THE BOUNDARY CONDITIONS FOR THE NEXT REGION.

REGION 3: $4\pi/3 \le \theta \le 5\pi/3$, $0 \le \theta_3 \le \pi/3$ $\beta_3 = \pi/3$

THE BOUNDARY CONDITIONS FOR THIS REGION ARE

$$s_3(0) = \frac{35}{6}in \quad (30)$$

$$v_3(0) = \frac{S_{in}}{\pi} \quad (31) \qquad v_4(\pi/3) = 0 \quad (33)$$

$$a_3(0) = 0 \quad (32)$$

THESE FOUR BOUNDARY CONDITIONS IMPLY A THIRD ORDER POLYNOMIAL THAT WILL HAVE FOUR CONSTANTS

$$s_3 = c_0 + c_1 \cdot \left(\frac{\theta_3}{\beta_3}\right) + c_2 \cdot \left(\frac{\theta_3}{\beta_3}\right)^2 + c_3 \cdot \left(\frac{\theta_3}{\beta_3}\right)^3 \quad (34)$$

$$v_3 = \frac{c_1}{\beta_3} + 2 \cdot \frac{c_2}{\beta_3}\left(\frac{\theta_3}{\beta_3}\right) + \frac{3 \cdot c_3}{\beta_3}\left(\frac{\theta_3}{\beta_3}\right)^2 \quad (35)$$

$$a_3 = \frac{2 \cdot c_2}{\beta_3^2} + \frac{6 \cdot c_3}{\beta_3^2}\left(\frac{\theta_3}{\beta_3}\right) \quad (36)$$

$$j = \frac{6 \cdot c_3}{\beta_3^3} \quad (37)$$

THE CONSTANTS CAN BE DETERMINED BY CONSIDERING THE BOUNDARY CONDITIONS (30) – (33).

$$(30) \rightarrow \quad s(0) = \frac{35}{6} in = c_0 \quad (38)$$

$$(31) \rightarrow \quad v(0) = \frac{5in}{\pi} = \frac{c_1}{\pi/3} \Rightarrow c_1 = \frac{5}{3} in \quad (39)$$

$$(32) \rightarrow \quad a(0) = 0 = \frac{2 \cdot c_2}{\beta_3^2} \Rightarrow c_2 = 0 \quad (40)$$

$$(33) + (38) + (39) + (40) \rightarrow v(\pi/3) = 0 = \frac{\frac{5}{3} in}{\pi/3} + 3\frac{c_3}{\pi/3}$$

$$\Rightarrow c_3 = -\frac{5}{9} in \quad (41)$$

NOW (34) – (37) CAN BE REWRITTEN

$$s_3 = \frac{35}{6} in + \frac{5}{3} in \left(\frac{\theta_3}{\pi/3}\right) - \frac{5}{9} in \left(\frac{\theta_3}{\pi/3}\right)^3 \quad (42)$$

$$v_3 = \frac{\frac{5}{3} in}{\pi/3} + \frac{3 \cdot \left(-\frac{5}{9} in\right)}{\pi/3} \cdot \left(\frac{\theta_3}{\pi/3}\right)^2 = \frac{5}{\pi} in - \frac{5}{\pi} in \left(\frac{\theta_3}{\pi/3}\right)^2 \quad (43)$$

$$a_3 = \frac{6 \cdot \left(-\frac{5}{9} in\right)}{\pi^2/9}\left(\frac{\theta_3}{\pi/3}\right) = -\frac{30}{\pi^2} in \left(\frac{\theta_3}{\pi/3}\right) \quad (44)$$

$$j_3 = \frac{6 \cdot \left(-\frac{5}{9} in\right)}{\pi^3/27} = \frac{90}{\pi^3} in \quad (45)$$

THE INITIAL VALUES OF THESE FUNCTIONS NOW NEED TO BE CALCULATED

$s_3(0) = \frac{35}{6} in$ (CHECKS WITH PREVIOUS SEGMENTS END CONDITION)

$v_3(0) = \frac{5}{\pi} in$ (CHECKS WITH PREVIOUS SEGMENTS END CONDITION)

$a_3(0) = 0$ (CHECKS WITH PREVIOUS REGIONS END CONDITION)

$j_3(0) = \frac{90}{\pi^3}$ in

THE END VALUES OF THESE FUNCTIONS FOR THIS REGION NEED TO BE CALCULATED. THE RESULTS ARE USED AS INITIAL CONDITIONS FOR THE FINAL REGION.

$$s_3\left(\frac{\pi}{3}\right) = \frac{35}{6}\text{in} + \frac{5}{3}\text{in} - \frac{5}{9}\text{in} = \frac{105}{18}\text{in} + \frac{30}{18}\text{in} - \frac{10}{18}\text{in} = \frac{125}{18}\text{in} \quad (46)$$

$$v_3\left(\frac{\pi}{3}\right) = 0 \quad (47)$$

$$a_3\left(\frac{\pi}{3}\right) = -\frac{30}{\pi^2}\ \text{in/rad}^2 \quad (48)$$

$$j_3\left(\frac{\pi}{3}\right) = \frac{90}{\pi^3}\ \text{in/rad}^3 \quad (49)$$

REGION 4: $\frac{5\pi}{3} \le \theta \le 2\pi$, $0 \le \theta_4 \le \frac{\pi}{3}$, $\beta_4 = \frac{\pi}{3}$

THE FOLLOWING BOUNDARY CONDITIONS FOR REGION 4 RESULT FROM THE NEED FOR CONTINUITY WITH REGIONS 3 AND 1

$$s_4(0) = \frac{125}{18}\text{in} \quad (50) \qquad s_4\left(\frac{\pi}{3}\right) = 0 \quad (53)$$

$$v_4(0) = 0 \quad (51) \qquad v_4\left(\frac{\pi}{3}\right) = 0 \quad (54)$$

$$a_4(0) = -\frac{30}{\pi^2}\frac{\text{in}}{\text{rad}^2} \quad (52) \qquad a_4\left(\frac{\pi}{3}\right) = 0 \quad (55)$$

THESE SIX BOUNDARY CONDITIONS IMPLY A POLYNOMIAL OF DEGREE 5

$$s_4 = \cancel{C_0} + \cancel{C_1}\left(\frac{\theta_4}{\beta_4}\right) + \cancel{C_2}\left(\frac{\theta_4}{\beta_4}\right)^2 + C_3\left(\frac{\theta_4}{\beta_4}\right)^3 + C_4\left(\frac{\theta_4}{\beta_4}\right)^4 + C_5\left(\frac{\theta_4}{\beta_4}\right)^5 \quad (56)$$

($\cancel{C_0} \to \frac{125}{18}$ in, $\cancel{C_1} \to 0$, $\cancel{C_2} \to -\frac{15}{9}$ in)

$$v_4 = \frac{\cancel{C_1}}{\beta_4} + 2\cdot\frac{\cancel{C_2}}{\beta_4}\cdot\left(\frac{\theta_4}{\beta_4}\right) + 3\cdot\frac{C_3}{\beta_4}\cdot\left(\frac{\theta_4}{\beta_4}\right)^2 + 4\cdot\frac{C_4}{\beta_4}\cdot\left(\frac{\theta_4}{\beta_4}\right)^3 + 5\cdot\frac{C_5}{\beta_4}\cdot\left(\frac{\theta_4}{\beta_4}\right)^4 \quad (57)$$

($\cancel{C_1} \to 0$, $\cancel{C_2} \to -\frac{15}{9}$ in)

$$a_4 = 2\cdot\frac{\cancel{C_2}}{\beta_4^2} + 6\cdot\frac{C_3}{\beta_4^2}\cdot\left(\frac{\theta_4}{\beta_4}\right) + 12\cdot\frac{C_4}{\beta_4^2}\cdot\left(\frac{\theta_4}{\beta_4}\right)^2 + 20\cdot\frac{C_5}{\beta_4^2}\cdot\left(\frac{\theta_4}{\beta_4}\right)^3 \quad (58)$$

($\cancel{C_2} \to -\frac{15}{9}$ in)

$$j_4 = 6\cdot\frac{C_3}{\beta_4^3} + 24\frac{C_4}{\beta_4^3}\cdot\left(\frac{\theta_4}{\beta_4}\right) + 60\frac{C_5}{\beta_4^3}\left(\frac{\theta_4}{\beta_4}\right)^2 \quad (59)$$

APPLYING THE BOUNDARY CONDITIONS IN ORDER TO SOLVE FOR THE CONSTANTS

(50) → (56) ⇒ $s_4(0) = \frac{125}{18}\text{in} = C_0$ (60)

(51) → (57) ⇒ $v_4(0) = 0 = \frac{C_1}{\beta_4}$ ⇒ $C_1 = 0$ (61)

(52) → (58) ⇒ $a_4(0) = a_3\left(\frac{\pi}{3}\right) = -\frac{30}{9\pi^2}in = \frac{2 \cdot C_2}{\beta_4^2}$

$$\Rightarrow C_2 = -\frac{30in}{9\pi^2} \cdot \frac{\beta_4^2}{2} = -\frac{30in}{9\pi^2}\frac{\left(\frac{\pi}{3}\right)^2}{2} = -\frac{15in}{9} = C_2 \quad (62)$$

THE FUNCTIONS (56) - (59) NEED TO BE REWRITTEN WITH (60) - (62) SUBSTITUTED IN FOR C_0, C_1 & C_2 BEFORE THE REMAINING BOUNDARY CONDITIONS CAN BE SOLVED FOR

$$S_4 = \frac{125}{18}in - \frac{15}{9}in\left(\frac{\Theta_4}{\beta_4}\right)^2 + C_3 \cdot \left(\frac{\Theta_4}{\beta_4}\right)^3 + C_4 \cdot \left(\frac{\Theta_4}{\beta_4}\right)^4 + C_5 \cdot \left(\frac{\Theta_4}{\beta_4}\right)^5 \quad (63)$$

$$v_4 = -\frac{30in}{9\beta_4}\left(\frac{\Theta_4}{\beta_4}\right) + 3 \cdot \frac{C_3}{\beta_4} \cdot \left(\frac{\Theta_4}{\beta_4}\right)^2 + 4 \cdot \frac{C_4}{\beta_4} \cdot \left(\frac{\Theta_4}{\beta_4}\right)^3 + 5 \cdot \frac{C_5}{\beta_4} \cdot \left(\frac{\Theta_4}{\beta_4}\right)^4 \quad (64)$$

$$a_4 = -\frac{30in}{9 \cdot \beta_4^2} + 6 \cdot \frac{C_3}{\beta_4^2} \cdot \left(\frac{\Theta_4}{\beta_4}\right) + 12 \cdot \frac{C_4}{\beta_4^2} \cdot \left(\frac{\Theta_4}{\beta_4}\right)^2 + 20 \cdot \frac{C_5}{\beta_4^2} \cdot \left(\frac{\Theta_4}{\beta_4}\right)^3 \quad (65)$$

$$j_4 = 6 \cdot \frac{C_3}{\beta_4^3} + 24 \cdot \frac{C_4}{\beta_4^3} \cdot \left(\frac{\Theta_4}{\beta_4}\right) + 60 \cdot \frac{C_5}{\beta_4^3} \cdot \left(\frac{\Theta_4}{\beta_4}\right)^2 \quad (66)$$

NOW THE BOUNDARY CONDITIONS IN (53) - (55) CAN BE USED TO DETERMINE C_3, C_4, & C_5. $\Theta_4/\beta_4 = 1$

(53) → (63) ⇒ $S_4\left(\frac{\pi}{3}\right) = 0 = \frac{125}{18}in - \frac{15in}{9} + C_3 + C_4 + C_5$

$$-\frac{75}{18}in = C_3 + C_4 + C_5 \quad (67)$$

(54) → (64) ⇒ $v_4\left(\frac{\pi}{3}\right) = 0 = -\frac{30in}{9 \cdot \beta_4} + 3 \cdot \frac{C_3}{\beta_4} + 4 \cdot \frac{C_4}{\beta_4} + 5 \cdot \frac{C_5}{\beta_4}$

$$\frac{30in}{9} = 3 \cdot C_3 + 4 \cdot C_4 + 5 \cdot C_5 \quad (68)$$

(55) → (65) ⇒ $a_4\left(\frac{\pi}{3}\right) = 0 = -\frac{30in}{9 \cdot \beta_4^2} + 6 \cdot \frac{C_3}{\beta_4^2} + 12 \cdot \frac{C_4}{\beta_4^2} + 20 \frac{C_5}{\beta_4^2}$

$$\frac{30in}{9} = 6 \cdot C_3 + 12 \cdot C_4 + 20 \cdot C_5 \quad (69)$$

NOW (67) - (69) CAN BE SOLVED SIMULTANEOUSLY USING EXCEL TO FIND VALUES FOR THE CONSTANTS C_3, C_4, & C_5.

$$\begin{bmatrix} 1 & 1 & 1 \\ 3 & 4 & 5 \\ 6 & 12 & 20 \end{bmatrix} \begin{Bmatrix} C_3 \\ C_4 \\ C_5 \end{Bmatrix} = \begin{Bmatrix} -5.27778 \\ 3.333333 \\ 3.333333 \end{Bmatrix}$$

$$\begin{bmatrix} 10 & -4 & 0.5 \\ -15 & 7 & -1 \\ 6 & -3 & 0.5 \end{bmatrix} \begin{Bmatrix} -5.27778 \\ 3.333333 \\ 3.333333 \end{Bmatrix} = \begin{Bmatrix} C_3 \\ C_4 \\ C_5 \end{Bmatrix}$$

$$= \begin{Bmatrix} -64.4444 \\ 99.16667 \\ -40 \end{Bmatrix}$$

(63) – (66) CAN NOW BE REWRITTEN

$$s_4 = \frac{125}{18}in - \frac{15}{9}in\left(\frac{\theta_4}{\beta_4}\right)^2 - 64.44in\left(\frac{\theta_4}{\beta_4}\right)^3 + 99.167in\cdot\left(\frac{\theta_4}{\beta_4}\right)^4 - 40in\left(\frac{\theta_4}{\beta_4}\right)^5 \quad (70)$$

$$v_4 = -\frac{30in}{9\cdot\beta_4}\cdot\left(\frac{\theta_4}{\beta_4}\right) - \frac{193.33in}{\beta_4}\left(\frac{\theta_4}{\beta_4}\right)^2 + \frac{396.67in}{\beta_4}\left(\frac{\theta_4}{\beta_4}\right)^3 + \frac{200in}{\beta_4}\left(\frac{\theta_4}{\beta_4}\right)^4 \quad (71)$$

$$a_4 = -\frac{30in}{9\cdot\beta_4^2} + \frac{386.7in}{\beta_4^2}\cdot\left(\frac{\theta_4}{\beta_4}\right) + \frac{1190in}{\beta_4^2}\left(\frac{\theta_4}{\beta_4}\right)^2 - \frac{800in}{\beta_4^2}\left(\frac{\theta_4}{\beta_4}\right)^3 \quad (72)$$

$$j_4 = -\frac{386.7in}{\beta_4^3} + \frac{2380in}{\beta_4^3}\left(\frac{\theta_4}{\beta_4}\right) + \frac{2400in}{\beta_4^3}\left(\frac{\theta_4}{\beta_4}\right)^2 \quad (73)$$

ON THE FOLLOWING PAGES THE FOUR REGIONS ARE PROGRAMMED INTO EXCEL AND THE CAM PROFILE PLOTTED.

θ		β_n		C_0	C_1	C_2	C_3	C_4	C_5	θ_n	θ_n/β_n	s	v	a	J
Deg	Rad	Deg	**Rad**	**in**	**in**	**in**	**in**	**in**	**in**	**Deg**	Rad		in	in/rad	in/rad^2	in/rad^3
0	=RADIANS(A6)	=DEGREES(E6)	=PI()/3	0	0	0	1.66666666666667	-0.833333333333333	0	0	=RADIANS(N6)	=O6/E6	=G6+H6*P6+I6*P6^2+	=(H6/E6)+(2*I6/E6)*P	=(2*I6/E6^2)+(6*J6/E	=(6*J6/E6^3)+(24*K6/
1	=RADIANS(A7)	=DEGREES(E7)	=PI()/3	0	0	0	1.66666666666667	-0.833333333333333	0	1	=RADIANS(N7)	=O7/E7	=G7+H7*P7+I7*P7^2+	=(H7/E7)+(2*I7/E7)*P	=(2*I7/E7^2)+(6*J7/E	=(6*J7/E7^3)+(24*K7/
2	=RADIANS(A8)	=DEGREES(E8)	=PI()/3	0	0	0	1.66666666666667	-0.833333333333333	0	2	=RADIANS(N8)	=O8/E8	=G8+H8*P8+I8*P8^2+	=(H8/E8)+(2*I8/E8)*P	=(2*I8/E8^2)+(6*J8/E	=(6*J8/E8^3)+(24*K8/
3	=RADIANS(A9)	=DEGREES(E9)	=PI()/3	0	0	0	1.66666666666667	-0.833333333333333	0	3	=RADIANS(N9)	=O9/E9	=G9+H9*P9+I9*P9^2+	=(H9/E9)+(2*I9/E9)*P	=(2*I9/E9^2)+(6*J9/E	=(6*J9/E9^3)+(24*K9/
4	=RADIANS(A10)	=DEGREES(E10)	=PI()/3	0	0	0	1.66666666666667	-0.833333333333333	0	4	=RADIANS(N10)	=O10/E10	=G10+H10*P10+I10*P	=(H10/E10)+(2*I10/E1	=(2*I10/E10^2)+(6*J1	=(6*J10/E10^3)+(24*K

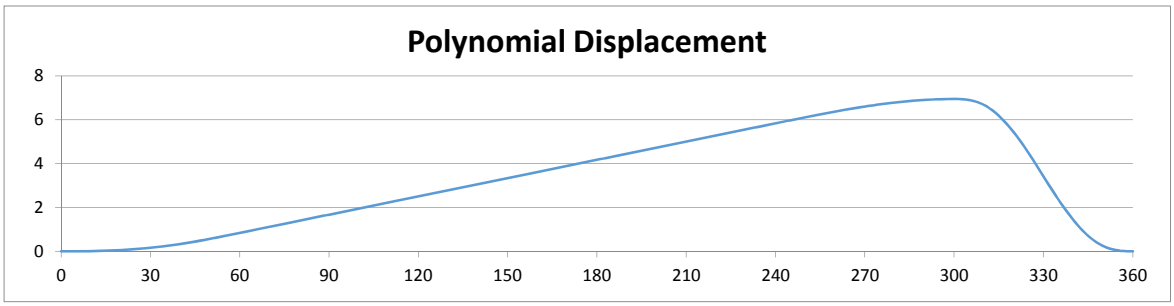
θ		β_n		C_0	C_1	C_2	C_3	C_4	C_5	θ_n		θ_n/β_n	s	v	a	J
Deg	Rad	Deg	**Rad**	**in**	**in**	**in**	**in**	**in**	**in**	**Deg**	Rad		in	in/rad	in/rad^2	in/rad^3
0	0	60	1.047198	0	0	0	1.666667	-0.83333	0	0	0	0	0	0	0	8.707914
1	0.017453	60	1.047198	0	0	0	1.666667	-0.83333	0	1	0.017453	0.016667	7.65E-06	0.001312	0.149449	8.41765
2	0.034907	60	1.047198	0	0	0	1.666667	-0.83333	0	2	0.034907	0.033333	6.07E-05	0.005187	0.293831	8.127387
3	0.05236	60	1.047198	0	0	0	1.666667	-0.83333	0	3	0.05236	0.05	0.000203	0.011539	0.433148	7.837123
4	0.069813	60	1.047198	0	0	0	1.666667	-0.83333	0	4	0.069813	0.066667	0.000477	0.020278	0.567399	7.546859
5	0.087266	60	1.047198	0	0	0	1.666667	-0.83333	0	5	0.087266	0.083333	0.000924	0.031315	0.696583	7.256595
6	0.10472	60	1.047198	0	0	0	1.666667	-0.83333	0	6	0.10472	0.1	0.001583	0.044563	0.820702	6.966331
7	0.122173	60	1.047198	0	0	0	1.666667	-0.83333	0	7	0.122173	0.116667	0.002492	0.059934	0.939754	6.676068
8	0.139626	60	1.047198	0	0	0	1.666667	-0.83333	0	8	0.139626	0.133333	0.003687	0.077338	1.05374	6.385804
9	0.15708	60	1.047198	0	0	0	1.666667	-0.83333	0	9	0.15708	0.15	0.005203	0.096687	1.162661	6.09554
10	0.174533	60	1.047198	0	0	0	1.666667	-0.83333	0	10	0.174533	0.166667	0.007073	0.117893	1.266515	5.805276
11	0.191986	60	1.047198	0	0	0	1.666667	-0.83333	0	11	0.191986	0.183333	0.009329	0.140867	1.365303	5.515012
12	0.20944	60	1.047198	0	0	0	1.666667	-0.83333	0	12	0.20944	0.2	0.012	0.165521	1.459025	5.224749
13	0.226893	60	1.047198	0	0	0	1.666667	-0.83333	0	13	0.226893	0.216667	0.015116	0.191767	1.547681	4.934485
14	0.244346	60	1.047198	0	0	0	1.666667	-0.83333	0	14	0.244346	0.233333	0.018703	0.219516	1.631271	4.644221
15	0.261799	60	1.047198	0	0	0	1.666667	-0.83333	0	15	0.261799	0.25	0.022786	0.24868	1.709795	4.353957
16	0.279253	60	1.047198	0	0	0	1.666667	-0.83333	0	16	0.279253	0.266667	0.027391	0.27917	1.783253	4.063693
17	0.296706	60	1.047198	0	0	0	1.666667	-0.83333	0	17	0.296706	0.283333	0.032539	0.310897	1.851645	3.77343
18	0.314159	60	1.047198	0	0	0	1.666667	-0.83333	0	18	0.314159	0.3	0.03825	0.343775	1.91497	3.483166
19	0.331613	60	1.047198	0	0	0	1.666667	-0.83333	0	19	0.331613	0.316667	0.044545	0.377713	1.97323	3.192902
20	0.349066	60	1.047198	0	0	0	1.666667	-0.83333	0	20	0.349066	0.333333	0.05144	0.412624	2.026424	2.902638
21	0.366519	60	1.047198	0	0	0	1.666667	-0.83333	0	21	0.366519	0.35	0.058953	0.448419	2.074551	2.612374
22	0.383972	60	1.047198	0	0	0	1.666667	-0.83333	0	22	0.383972	0.366667	0.067098	0.48501	2.117613	2.32211
23	0.401426	60	1.047198	0	0	0	1.666667	-0.83333	0	23	0.401426	0.383333	0.075887	0.522308	2.155608	2.031847
24	0.418879	60	1.047198	0	0	0	1.666667	-0.83333	0	24	0.418879	0.4	0.085333	0.560225	2.188538	1.741583
25	0.436332	60	1.047198	0	0	0	1.666667	-0.83333	0	25	0.436332	0.416667	0.095446	0.598673	2.216401	1.451319
26	0.453786	60	1.047198	0	0	0	1.666667	-0.83333	0	26	0.453786	0.433333	0.106234	0.637563	2.239198	1.161055
27	0.471239	60	1.047198	0	0	0	1.666667	-0.83333	0	27	0.471239	0.45	0.117703	0.676806	2.256929	0.870791
28	0.488692	60	1.047198	0	0	0	1.666667	-0.83333	0	28	0.488692	0.466667	0.12986	0.716315	2.269595	0.580528
29	0.506145	60	1.047198	0	0	0	1.666667	-0.83333	0	29	0.506145	0.483333	0.142708	0.756001	2.277194	0.290264
30	0.523599	60	1.047198	0	0	0	1.666667	-0.83333	0	30	0.523599	0.5	0.15625	0.795775	2.279727	0
31	0.541052	60	1.047198	0	0	0	1.666667	-0.83333	0	31	0.541052	0.516667	0.170486	0.835549	2.277194	-0.29026
32	0.558505	60	1.047198	0	0	0	1.666667	-0.83333	0	32	0.558505	0.533333	0.185416	0.875234	2.269595	-0.58053
33	0.575959	60	1.047198	0	0	0	1.666667	-0.83333	0	33	0.575959	0.55	0.201036	0.914743	2.256929	-0.87079
34	0.593412	60	1.047198	0	0	0	1.666667	-0.83333	0	34	0.593412	0.566667	0.217345	0.953987	2.239198	-1.16106
35	0.610865	60	1.047198	0	0	0	1.666667	-0.83333	0	35	0.610865	0.583333	0.234335	0.992876	2.216401	-1.45132
36	0.628319	60	1.047198	0	0	0	1.666667	-0.83333	0	36	0.628319	0.6	0.252	1.031324	2.188538	-1.74158
37	0.645772	60	1.047198	0	0	0	1.666667	-0.83333	0	37	0.645772	0.616667	0.270332	1.069241	2.155608	-2.03185
38	0.663225	60	1.047198	0	0	0	1.666667	-0.83333	0	38	0.663225	0.633333	0.28932	1.106539	2.117613	-2.32211
39	0.680678	60	1.047198	0	0	0	1.666667	-0.83333	0	39	0.680678	0.65	0.308953	1.14313	2.074551	-2.61237
40	0.698132	60	1.047198	0	0	0	1.666667	-0.83333	0	40	0.698132	0.666667	0.329218	1.178926	2.026424	-2.90264
41	0.715585	60	1.047198	0	0	0	1.666667	-0.83333	0	41	0.715585	0.683333	0.3501	1.213836	1.97323	-3.1929
42	0.733038	60	1.047198	0	0	0	1.666667	-0.83333	0	42	0.733038	0.7	0.371583	1.247775	1.91497	-3.48317
43	0.750492	60	1.047198	0	0	0	1.666667	-0.83333	0	43	0.750492	0.716667	0.39365	1.280652	1.851645	-3.77343
44	0.767945	60	1.047198	0	0	0	1.666667	-0.83333	0	44	0.767945	0.733333	0.41628	1.31238	1.783253	-4.06369
45	0.785398	60	1.047198	0	0	0	1.666667	-0.83333	0	45	0.785398	0.75	0.439453	1.34287	1.709795	-4.35396
46	0.802851	60	1.047198	0	0	0	1.666667	-0.83333	0	46	0.802851	0.766667	0.463147	1.372034	1.631271	-4.64422
47	0.820305	60	1.047198	0	0	0	1.666667	-0.83333	0	47	0.820305	0.783333	0.487338	1.399782	1.547681	-4.93448
48	0.837758	60	1.047198	0	0	0	1.666667	-0.83333	0	48	0.837758	0.8	0.512	1.426028	1.459025	-5.22475
49	0.855211	60	1.047198	0	0	0	1.666667	-0.83333	0	49	0.855211	0.816667	0.537106	1.450683	1.365303	-5.51501
50	0.872665	60	1.047198	0	0	0	1.666667	-0.83333	0	50	0.872665	0.833333	0.562629	1.473657	1.266515	-5.80528
51	0.890118	60	1.047198	0	0	0	1.666667	-0.83333	0	51	0.890118	0.85	0.588536	1.494863	1.162661	-6.09554
52	0.907571	60	1.047198	0	0	0	1.666667	-0.83333	0	52	0.907571	0.866667	0.614798	1.514212	1.05374	-6.3858
53	0.925025	60	1.047198	0	0	0	1.666667	-0.83333	0	53	0.925025	0.883333	0.641381	1.531616	0.939754	-6.67607
54	0.942478	60	1.047198	0	0	0	1.666667	-0.83333	0	54	0.942478	0.9	0.66825	1.546986	0.820702	-6.96633
55	0.959931	60	1.047198	0	0	0	1.666667	-0.83333	0	55	0.959931	0.916667	0.695369	1.560234	0.696583	-7.2566
56	0.977384	60	1.047198	0	0	0	1.666667	-0.83333	0	56	0.977384	0.933333	0.7227	1.571272	0.567399	-7.54686
57	0.994838	60	1.047198	0	0	0	1.666667	-0.83333	0	57	0.994838	0.95	0.750203	1.580011	0.433148	-7.83712
58	1.012291	60	1.047198	0	0	0	1.666667	-0.83333	0	58	1.012291	0.966667	0.777838	1.586362	0.293831	-8.12739
59	1.029744	60	1.047198	0	0	0	1.666667	-0.83333	0	59	1.029744	0.983333	0.805563	1.590238	0.149449	-8.41765
60	1.047198	60	1.047198	0	0	0	1.666667	-0.83333	0	60	1.047198	1	0.833333	1.591549	0	-8.70791
60	1.047198	180	3.141593	0.8333333	5	0	0	0	0	0	0	0	0.833333	1.591549	0	0
61	1.064651	180	3.141593	0.8333333	5	0	0	0	0	1	0.017453	0.005556	0.861111	1.591549	0	0
62	1.082104	180	3.141593	0.8333333	5	0	0	0	0	2	0.034907	0.011111	0.888889	1.591549	0	0
63	1.099557	180	3.141593	0.8333333	5	0	0	0	0	3	0.05236	0.016667	0.916667	1.591549	0	0
64	1.117011	180	3.141593	0.8333333	5	0	0	0	0	4	0.069813	0.022222	0.944444	1.591549	0	0
65	1.134464	180	3.141593	0.8333333	5	0	0	0	0	5	0.087266	0.027778	0.972222	1.591549	0	0
66	1.151917	180	3.141593	0.8333333	5	0	0	0	0	6	0.10472	0.033333	1	1.591549	0	0
67	1.169371	180	3.141593	0.8333333	5	0	0	0	0	7	0.122173	0.038889	1.027778	1.591549	0	0
68	1.186824	180	3.141593	0.8333333	5	0	0	0	0	8	0.139626	0.044444	1.055556	1.591549	0	0
69	1.204277	180	3.141593	0.8333333	5	0	0	0	0	9	0.15708	0.05	1.083333	1.591549	0	0
70	1.22173	180	3.141593	0.8333333	5	0	0	0	0	10	0.174533	0.055556	1.111111	1.591549	0	0
71	1.239184	180	3.141593	0.8333333	5	0	0	0	0	11	0.191986	0.061111	1.138889	1.591549	0	0
72	1.256637	180	3.141593	0.8333333	5	0	0	0	0	12	0.20944	0.066667	1.166667	1.591549	0	0
73	1.27409	180	3.141593	0.8333333	5	0	0	0	0	13	0.226893	0.072222	1.194444	1.591549	0	0
74	1.291544	180	3.141593	0.8333333	5	0	0	0	0	14	0.244346	0.077778	1.222222	1.591549	0	0
75	1.308997	180	3.141593	0.8333333	5	0	0	0	0	15	0.261799	0.083333	1.25	1.591549	0	0
76	1.32645	180	3.141593	0.8333333	5	0	0	0	0	16	0.279253	0.088889	1.277778	1.591549	0	0
77	1.343904	180	3.141593	0.8333333	5	0	0	0	0	17	0.296706	0.094444	1.305556	1.591549	0	0
78	1.361357	180	3.141593	0.8333333	5	0	0	0	0	18	0.314159	0.1	1.333333	1.591549	0	0
79	1.37881	180	3.141593	0.8333333	5	0	0	0	0	19	0.331613	0.105556	1.361111	1.591549	0	0
80	1.396263	180	3.141593	0.8333333	5	0	0	0	0	20	0.349066	0.111111	1.388889	1.591549	0	0
81	1.413717	180	3.141593	0.8333333	5	0	0	0	0	21	0.366519	0.116667	1.416667	1.591549	0	0
82	1.43117	180	3.141593	0.8333333	5	0	0	0	0	22	0.383972	0.122222	1.444444	1.591549	0	0

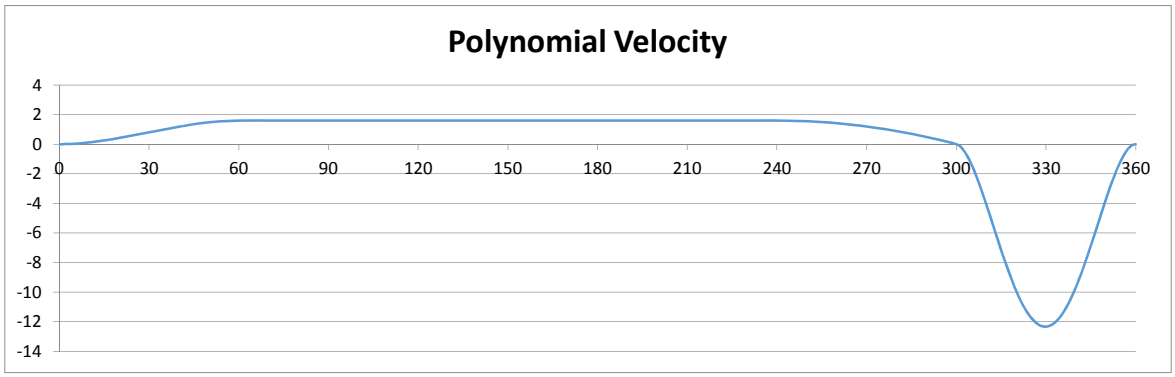
83	1.448623	180	3.141593	0.8333333	5	0	0	0	0	23	0.401426	0.127778	1.472222	1.591549	0	0
84	1.466077	180	3.141593	0.8333333	5	0	0	0	0	24	0.418879	0.133333	1.5	1.591549	0	0
85	1.48353	180	3.141593	0.8333333	5	0	0	0	0	25	0.436332	0.138889	1.527778	1.591549	0	0
86	1.500983	180	3.141593	0.8333333	5	0	0	0	0	26	0.453786	0.144444	1.555556	1.591549	0	0
87	1.518436	180	3.141593	0.8333333	5	0	0	0	0	27	0.471239	0.15	1.583333	1.591549	0	0
88	1.53589	180	3.141593	0.8333333	5	0	0	0	0	28	0.488692	0.155556	1.611111	1.591549	0	0
89	1.553343	180	3.141593	0.8333333	5	0	0	0	0	29	0.506145	0.161111	1.638889	1.591549	0	0
90	1.570796	180	3.141593	0.8333333	5	0	0	0	0	30	0.523599	0.166667	1.666667	1.591549	0	0
91	1.58825	180	3.141593	0.8333333	5	0	0	0	0	31	0.541052	0.172222	1.694444	1.591549	0	0
92	1.605703	180	3.141593	0.8333333	5	0	0	0	0	32	0.558505	0.177778	1.722222	1.591549	0	0
93	1.623156	180	3.141593	0.8333333	5	0	0	0	0	33	0.575959	0.183333	1.75	1.591549	0	0
94	1.640609	180	3.141593	0.8333333	5	0	0	0	0	34	0.593412	0.188889	1.777778	1.591549	0	0
95	1.658063	180	3.141593	0.8333333	5	0	0	0	0	35	0.610865	0.194444	1.805556	1.591549	0	0
96	1.675516	180	3.141593	0.8333333	5	0	0	0	0	36	0.628319	0.2	1.833333	1.591549	0	0
97	1.692969	180	3.141593	0.8333333	5	0	0	0	0	37	0.645772	0.205556	1.861111	1.591549	0	0
98	1.710423	180	3.141593	0.8333333	5	0	0	0	0	38	0.663225	0.211111	1.888889	1.591549	0	0
99	1.727876	180	3.141593	0.8333333	5	0	0	0	0	39	0.680678	0.216667	1.916667	1.591549	0	0
100	1.745329	180	3.141593	0.8333333	5	0	0	0	0	40	0.698132	0.222222	1.944444	1.591549	0	0
101	1.762783	180	3.141593	0.8333333	5	0	0	0	0	41	0.715585	0.227778	1.972222	1.591549	0	0
102	1.780236	180	3.141593	0.8333333	5	0	0	0	0	42	0.733038	0.233333	2	1.591549	0	0
103	1.797689	180	3.141593	0.8333333	5	0	0	0	0	43	0.750492	0.238889	2.027778	1.591549	0	0
104	1.815142	180	3.141593	0.8333333	5	0	0	0	0	44	0.767945	0.244444	2.055556	1.591549	0	0
105	1.832596	180	3.141593	0.8333333	5	0	0	0	0	45	0.785398	0.25	2.083333	1.591549	0	0
106	1.850049	180	3.141593	0.8333333	5	0	0	0	0	46	0.802851	0.255556	2.111111	1.591549	0	0
107	1.867502	180	3.141593	0.8333333	5	0	0	0	0	47	0.820305	0.261111	2.138889	1.591549	0	0
108	1.884956	180	3.141593	0.8333333	5	0	0	0	0	48	0.837758	0.266667	2.166667	1.591549	0	0
109	1.902409	180	3.141593	0.8333333	5	0	0	0	0	49	0.855211	0.272222	2.194444	1.591549	0	0
110	1.919862	180	3.141593	0.8333333	5	0	0	0	0	50	0.872665	0.277778	2.222222	1.591549	0	0
111	1.937315	180	3.141593	0.8333333	5	0	0	0	0	51	0.890118	0.283333	2.25	1.591549	0	0
112	1.954769	180	3.141593	0.8333333	5	0	0	0	0	52	0.907571	0.288889	2.277778	1.591549	0	0
113	1.972222	180	3.141593	0.8333333	5	0	0	0	0	53	0.925025	0.294444	2.305556	1.591549	0	0
114	1.989675	180	3.141593	0.8333333	5	0	0	0	0	54	0.942478	0.3	2.333333	1.591549	0	0
115	2.007129	180	3.141593	0.8333333	5	0	0	0	0	55	0.959931	0.305556	2.361111	1.591549	0	0
116	2.024582	180	3.141593	0.8333333	5	0	0	0	0	56	0.977384	0.311111	2.388889	1.591549	0	0
117	2.042035	180	3.141593	0.8333333	5	0	0	0	0	57	0.994838	0.316667	2.416667	1.591549	0	0
118	2.059489	180	3.141593	0.8333333	5	0	0	0	0	58	1.012291	0.322222	2.444444	1.591549	0	0
119	2.076942	180	3.141593	0.8333333	5	0	0	0	0	59	1.029744	0.327778	2.472222	1.591549	0	0
120	2.094395	180	3.141593	0.8333333	5	0	0	0	0	60	1.047198	0.333333	2.5	1.591549	0	0
121	2.111848	180	3.141593	0.8333333	5	0	0	0	0	61	1.064651	0.338889	2.527778	1.591549	0	0
122	2.129302	180	3.141593	0.8333333	5	0	0	0	0	62	1.082104	0.344444	2.555556	1.591549	0	0
123	2.146755	180	3.141593	0.8333333	5	0	0	0	0	63	1.099557	0.35	2.583333	1.591549	0	0
124	2.164208	180	3.141593	0.8333333	5	0	0	0	0	64	1.117011	0.355556	2.611111	1.591549	0	0
125	2.181662	180	3.141593	0.8333333	5	0	0	0	0	65	1.134464	0.361111	2.638889	1.591549	0	0
126	2.199115	180	3.141593	0.8333333	5	0	0	0	0	66	1.151917	0.366667	2.666667	1.591549	0	0
127	2.216568	180	3.141593	0.8333333	5	0	0	0	0	67	1.169371	0.372222	2.694444	1.591549	0	0
128	2.234021	180	3.141593	0.8333333	5	0	0	0	0	68	1.186824	0.377778	2.722222	1.591549	0	0
129	2.251475	180	3.141593	0.8333333	5	0	0	0	0	69	1.204277	0.383333	2.75	1.591549	0	0
130	2.268928	180	3.141593	0.8333333	5	0	0	0	0	70	1.22173	0.388889	2.777778	1.591549	0	0
131	2.286381	180	3.141593	0.8333333	5	0	0	0	0	71	1.239184	0.394444	2.805556	1.591549	0	0
132	2.303835	180	3.141593	0.8333333	5	0	0	0	0	72	1.256637	0.4	2.833333	1.591549	0	0
133	2.321288	180	3.141593	0.8333333	5	0	0	0	0	73	1.27409	0.405556	2.861111	1.591549	0	0
134	2.338741	180	3.141593	0.8333333	5	0	0	0	0	74	1.291544	0.411111	2.888889	1.591549	0	0
135	2.356194	180	3.141593	0.8333333	5	0	0	0	0	75	1.308997	0.416667	2.916667	1.591549	0	0
136	2.373648	180	3.141593	0.8333333	5	0	0	0	0	76	1.32645	0.422222	2.944444	1.591549	0	0
137	2.391101	180	3.141593	0.8333333	5	0	0	0	0	77	1.343904	0.427778	2.972222	1.591549	0	0
138	2.408554	180	3.141593	0.8333333	5	0	0	0	0	78	1.361357	0.433333	3	1.591549	0	0
139	2.426008	180	3.141593	0.8333333	5	0	0	0	0	79	1.37881	0.438889	3.027778	1.591549	0	0
140	2.443461	180	3.141593	0.8333333	5	0	0	0	0	80	1.396263	0.444444	3.055556	1.591549	0	0
141	2.460914	180	3.141593	0.8333333	5	0	0	0	0	81	1.413717	0.45	3.083333	1.591549	0	0
142	2.478368	180	3.141593	0.8333333	5	0	0	0	0	82	1.43117	0.455556	3.111111	1.591549	0	0
143	2.495821	180	3.141593	0.8333333	5	0	0	0	0	83	1.448623	0.461111	3.138889	1.591549	0	0
144	2.513274	180	3.141593	0.8333333	5	0	0	0	0	84	1.466077	0.466667	3.166667	1.591549	0	0
145	2.530727	180	3.141593	0.8333333	5	0	0	0	0	85	1.48353	0.472222	3.194444	1.591549	0	0
146	2.548181	180	3.141593	0.8333333	5	0	0	0	0	86	1.500983	0.477778	3.222222	1.591549	0	0
147	2.565634	180	3.141593	0.8333333	5	0	0	0	0	87	1.518436	0.483333	3.25	1.591549	0	0
148	2.583087	180	3.141593	0.8333333	5	0	0	0	0	88	1.53589	0.488889	3.277778	1.591549	0	0
149	2.600541	180	3.141593	0.8333333	5	0	0	0	0	89	1.553343	0.494444	3.305556	1.591549	0	0
150	2.617994	180	3.141593	0.8333333	5	0	0	0	0	90	1.570796	0.5	3.333333	1.591549	0	0
151	2.635447	180	3.141593	0.8333333	5	0	0	0	0	91	1.58825	0.505556	3.361111	1.591549	0	0
152	2.6529	180	3.141593	0.8333333	5	0	0	0	0	92	1.605703	0.511111	3.388889	1.591549	0	0
153	2.670354	180	3.141593	0.8333333	5	0	0	0	0	93	1.623156	0.516667	3.416667	1.591549	0	0
154	2.687807	180	3.141593	0.8333333	5	0	0	0	0	94	1.640609	0.522222	3.444444	1.591549	0	0
155	2.70526	180	3.141593	0.8333333	5	0	0	0	0	95	1.658063	0.527778	3.472222	1.591549	0	0
156	2.722714	180	3.141593	0.8333333	5	0	0	0	0	96	1.675516	0.533333	3.5	1.591549	0	0
157	2.740167	180	3.141593	0.8333333	5	0	0	0	0	97	1.692969	0.538889	3.527778	1.591549	0	0
158	2.75762	180	3.141593	0.8333333	5	0	0	0	0	98	1.710423	0.544444	3.555556	1.591549	0	0
159	2.775074	180	3.141593	0.8333333	5	0	0	0	0	99	1.727876	0.55	3.583333	1.591549	0	0
160	2.792527	180	3.141593	0.8333333	5	0	0	0	0	100	1.745329	0.555556	3.611111	1.591549	0	0
161	2.80998	180	3.141593	0.8333333	5	0	0	0	0	101	1.762783	0.561111	3.638889	1.591549	0	0
162	2.827433	180	3.141593	0.8333333	5	0	0	0	0	102	1.780236	0.566667	3.666667	1.591549	0	0
163	2.844887	180	3.141593	0.8333333	5	0	0	0	0	103	1.797689	0.572222	3.694444	1.591549	0	0
164	2.86234	180	3.141593	0.8333333	5	0	0	0	0	104	1.815142	0.577778	3.722222	1.591549	0	0
165	2.879793	180	3.141593	0.8333333	5	0	0	0	0	105	1.832596	0.583333	3.75	1.591549	0	0
166	2.897247	180	3.141593	0.8333333	5	0	0	0	0	106	1.850049	0.588889	3.777778	1.591549	0	0
167	2.9147	180	3.141593	0.8333333	5	0	0	0	0	107	1.867502	0.594444	3.805556	1.591549	0	0
168	2.932153	180	3.141593	0.8333333	5	0	0	0	0	108	1.884956	0.6	3.833333	1.591549	0	0
169	2.949606	180	3.141593	0.8333333	5	0	0	0	0	109	1.902409	0.605556	3.861111	1.591549	0	0

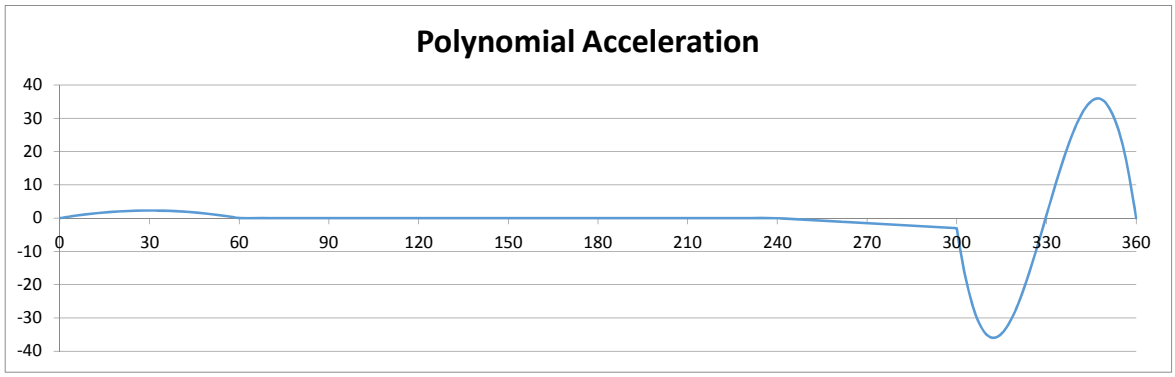
170	2.96706	180	3.141593	0.8333333	5	0	0	0	0	110	1.919862	0.611111	3.888889	1.591549	0	0
171	2.984513	180	3.141593	0.8333333	5	0	0	0	0	111	1.937315	0.616667	3.916667	1.591549	0	0
172	3.001966	180	3.141593	0.8333333	5	0	0	0	0	112	1.954769	0.622222	3.944444	1.591549	0	0
173	3.01942	180	3.141593	0.8333333	5	0	0	0	0	113	1.972222	0.627778	3.972222	1.591549	0	0
174	3.036873	180	3.141593	0.8333333	5	0	0	0	0	114	1.989675	0.633333	4	1.591549	0	0
175	3.054326	180	3.141593	0.8333333	5	0	0	0	0	115	2.007129	0.638889	4.027778	1.591549	0	0
176	3.071779	180	3.141593	0.8333333	5	0	0	0	0	116	2.024582	0.644444	4.055556	1.591549	0	0
177	3.089233	180	3.141593	0.8333333	5	0	0	0	0	117	2.042035	0.65	4.083333	1.591549	0	0
178	3.106686	180	3.141593	0.8333333	5	0	0	0	0	118	2.059489	0.655556	4.111111	1.591549	0	0
179	3.124139	180	3.141593	0.8333333	5	0	0	0	0	119	2.076942	0.661111	4.138889	1.591549	0	0
180	3.141593	180	3.141593	0.8333333	5	0	0	0	0	120	2.094395	0.666667	4.166667	1.591549	0	0
181	3.159046	180	3.141593	0.8333333	5	0	0	0	0	121	2.111848	0.672222	4.194444	1.591549	0	0
182	3.176499	180	3.141593	0.8333333	5	0	0	0	0	122	2.129302	0.677778	4.222222	1.591549	0	0
183	3.193953	180	3.141593	0.8333333	5	0	0	0	0	123	2.146755	0.683333	4.25	1.591549	0	0
184	3.211406	180	3.141593	0.8333333	5	0	0	0	0	124	2.164208	0.688889	4.277778	1.591549	0	0
185	3.228859	180	3.141593	0.8333333	5	0	0	0	0	125	2.181662	0.694444	4.305556	1.591549	0	0
186	3.246312	180	3.141593	0.8333333	5	0	0	0	0	126	2.199115	0.7	4.333333	1.591549	0	0
187	3.263766	180	3.141593	0.8333333	5	0	0	0	0	127	2.216568	0.705556	4.361111	1.591549	0	0
188	3.281219	180	3.141593	0.8333333	5	0	0	0	0	128	2.234021	0.711111	4.388889	1.591549	0	0
189	3.298672	180	3.141593	0.8333333	5	0	0	0	0	129	2.251475	0.716667	4.416667	1.591549	0	0
190	3.316126	180	3.141593	0.8333333	5	0	0	0	0	130	2.268928	0.722222	4.444444	1.591549	0	0
191	3.333579	180	3.141593	0.8333333	5	0	0	0	0	131	2.286381	0.727778	4.472222	1.591549	0	0
192	3.351032	180	3.141593	0.8333333	5	0	0	0	0	132	2.303835	0.733333	4.5	1.591549	0	0
193	3.368485	180	3.141593	0.8333333	5	0	0	0	0	133	2.321288	0.738889	4.527778	1.591549	0	0
194	3.385939	180	3.141593	0.8333333	5	0	0	0	0	134	2.338741	0.744444	4.555556	1.591549	0	0
195	3.403392	180	3.141593	0.8333333	5	0	0	0	0	135	2.356194	0.75	4.583333	1.591549	0	0
196	3.420845	180	3.141593	0.8333333	5	0	0	0	0	136	2.373648	0.755556	4.611111	1.591549	0	0
197	3.438299	180	3.141593	0.8333333	5	0	0	0	0	137	2.391101	0.761111	4.638889	1.591549	0	0
198	3.455752	180	3.141593	0.8333333	5	0	0	0	0	138	2.408554	0.766667	4.666667	1.591549	0	0
199	3.473205	180	3.141593	0.8333333	5	0	0	0	0	139	2.426008	0.772222	4.694444	1.591549	0	0
200	3.490659	180	3.141593	0.8333333	5	0	0	0	0	140	2.443461	0.777778	4.722222	1.591549	0	0
201	3.508112	180	3.141593	0.8333333	5	0	0	0	0	141	2.460914	0.783333	4.75	1.591549	0	0
202	3.525565	180	3.141593	0.8333333	5	0	0	0	0	142	2.478368	0.788889	4.777778	1.591549	0	0
203	3.543018	180	3.141593	0.8333333	5	0	0	0	0	143	2.495821	0.794444	4.805556	1.591549	0	0
204	3.560472	180	3.141593	0.8333333	5	0	0	0	0	144	2.513274	0.8	4.833333	1.591549	0	0
205	3.577925	180	3.141593	0.8333333	5	0	0	0	0	145	2.530727	0.805556	4.861111	1.591549	0	0
206	3.595378	180	3.141593	0.8333333	5	0	0	0	0	146	2.548181	0.811111	4.888889	1.591549	0	0
207	3.612832	180	3.141593	0.8333333	5	0	0	0	0	147	2.565634	0.816667	4.916667	1.591549	0	0
208	3.630285	180	3.141593	0.8333333	5	0	0	0	0	148	2.583087	0.822222	4.944444	1.591549	0	0
209	3.647738	180	3.141593	0.8333333	5	0	0	0	0	149	2.600541	0.827778	4.972222	1.591549	0	0
210	3.665191	180	3.141593	0.8333333	5	0	0	0	0	150	2.617994	0.833333	5	1.591549	0	0
211	3.682645	180	3.141593	0.8333333	5	0	0	0	0	151	2.635447	0.838889	5.027778	1.591549	0	0
212	3.700098	180	3.141593	0.8333333	5	0	0	0	0	152	2.6529	0.844444	5.055556	1.591549	0	0
213	3.717551	180	3.141593	0.8333333	5	0	0	0	0	153	2.670354	0.85	5.083333	1.591549	0	0
214	3.735005	180	3.141593	0.8333333	5	0	0	0	0	154	2.687807	0.855556	5.111111	1.591549	0	0
215	3.752458	180	3.141593	0.8333333	5	0	0	0	0	155	2.70526	0.861111	5.138889	1.591549	0	0
216	3.769911	180	3.141593	0.8333333	5	0	0	0	0	156	2.722714	0.866667	5.166667	1.591549	0	0
217	3.787364	180	3.141593	0.8333333	5	0	0	0	0	157	2.740167	0.872222	5.194444	1.591549	0	0
218	3.804818	180	3.141593	0.8333333	5	0	0	0	0	158	2.75762	0.877778	5.222222	1.591549	0	0
219	3.822271	180	3.141593	0.8333333	5	0	0	0	0	159	2.775074	0.883333	5.25	1.591549	0	0
220	3.839724	180	3.141593	0.8333333	5	0	0	0	0	160	2.792527	0.888889	5.277778	1.591549	0	0
221	3.857178	180	3.141593	0.8333333	5	0	0	0	0	161	2.80998	0.894444	5.305556	1.591549	0	0
222	3.874631	180	3.141593	0.8333333	5	0	0	0	0	162	2.827433	0.9	5.333333	1.591549	0	0
223	3.892084	180	3.141593	0.8333333	5	0	0	0	0	163	2.844887	0.905556	5.361111	1.591549	0	0
224	3.909538	180	3.141593	0.8333333	5	0	0	0	0	164	2.86234	0.911111	5.388889	1.591549	0	0
225	3.926991	180	3.141593	0.8333333	5	0	0	0	0	165	2.879793	0.916667	5.416667	1.591549	0	0
226	3.944444	180	3.141593	0.8333333	5	0	0	0	0	166	2.897247	0.922222	5.444444	1.591549	0	0
227	3.961897	180	3.141593	0.8333333	5	0	0	0	0	167	2.9147	0.927778	5.472222	1.591549	0	0
228	3.979351	180	3.141593	0.8333333	5	0	0	0	0	168	2.932153	0.933333	5.5	1.591549	0	0
229	3.996804	180	3.141593	0.8333333	5	0	0	0	0	169	2.949606	0.938889	5.527778	1.591549	0	0
230	4.014257	180	3.141593	0.8333333	5	0	0	0	0	170	2.96706	0.944444	5.555556	1.591549	0	0
231	4.031711	180	3.141593	0.8333333	5	0	0	0	0	171	2.984513	0.95	5.583333	1.591549	0	0
232	4.049164	180	3.141593	0.8333333	5	0	0	0	0	172	3.001966	0.955556	5.611111	1.591549	0	0
233	4.066617	180	3.141593	0.8333333	5	0	0	0	0	173	3.01942	0.961111	5.638889	1.591549	0	0
234	4.08407	180	3.141593	0.8333333	5	0	0	0	0	174	3.036873	0.966667	5.666667	1.591549	0	0
235	4.101524	180	3.141593	0.8333333	5	0	0	0	0	175	3.054326	0.972222	5.694444	1.591549	0	0
236	4.118977	180	3.141593	0.8333333	5	0	0	0	0	176	3.071779	0.977778	5.722222	1.591549	0	0
237	4.13643	180	3.141593	0.8333333	5	0	0	0	0	177	3.089233	0.983333	5.75	1.591549	0	0
238	4.153884	180	3.141593	0.8333333	5	0	0	0	0	178	3.106686	0.988889	5.777778	1.591549	0	0
239	4.171337	180	3.141593	0.8333333	5	0	0	0	0	179	3.124139	0.994444	5.805556	1.591549	0	0
240	4.18879	180	3.141593	0.8333333	5	0	0	0	0	180	3.141593	1	5.833333	1.591549	0	0
240	4.18879	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	0	0	0	5.833333	1.591549	0	-2.90264
241	4.206243	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	1	0.017453	0.016667	5.861109	1.591107	-0.05066	-2.90264
242	4.223697	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	2	0.034907	0.033333	5.888868	1.589781	-0.10132	-2.90264
243	4.24115	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	3	0.05236	0.05	5.916597	1.587571	-0.15198	-2.90264
244	4.258603	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	4	0.069813	0.066667	5.94428	1.584476	-0.20264	-2.90264
245	4.276057	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	5	0.087266	0.083333	5.971901	1.580497	-0.2533	-2.90264
246	4.29351	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	6	0.10472	0.1	5.999444	1.575634	-0.30396	-2.90264
247	4.310963	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	7	0.122173	0.116667	6.026896	1.569887	-0.35462	-2.90264
248	4.328417	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	8	0.139626	0.133333	6.054239	1.563255	-0.40528	-2.90264
249	4.34587	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	9	0.15708	0.15	6.081458	1.55574	-0.45595	-2.90264
250	4.363323	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	10	0.174533	0.166667	6.108539	1.54734	-0.50661	-2.90264
251	4.380776	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	11	0.191986	0.183333	6.135466	1.538056	-0.55727	-2.90264
252	4.39823	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	12	0.20944	0.2	6.162222	1.527887	-0.60793	-2.90264
253	4.415683	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	13	0.226893	0.216667	6.188794	1.516835	-0.65859	-2.90264
254	4.433136	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	14	0.244346	0.233333	6.215165	1.504898	-0.70925	-2.90264
255	4.45059	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	15	0.261799	0.25	6.241319	1.492078	-0.75991	-2.90264

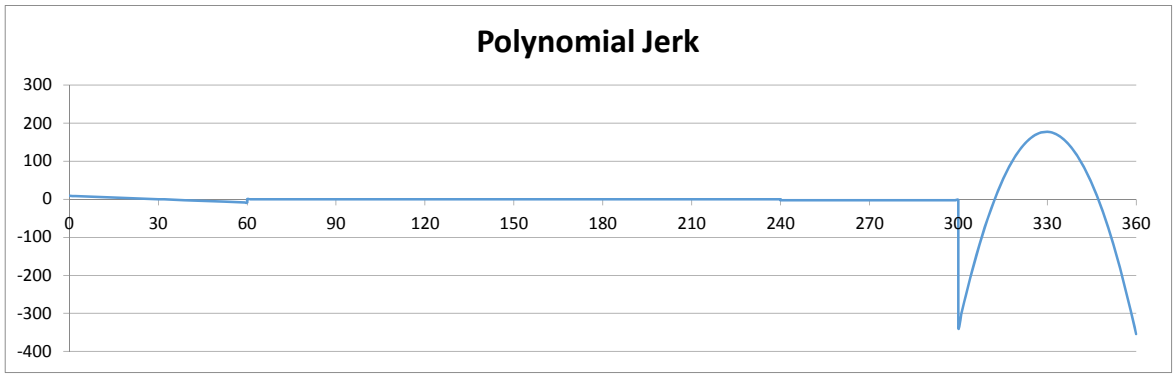
256	4.468043	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	16	0.279253	0.266667	6.267243	1.478373	-0.81057	-2.90264
257	4.485496	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	17	0.296706	0.283333	6.292919	1.463783	-0.86123	-2.90264
258	4.502949	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	18	0.314159	0.3	6.318333	1.44831	-0.91189	-2.90264
259	4.520403	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	19	0.331613	0.316667	6.34347	1.431952	-0.96255	-2.90264
260	4.537856	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	20	0.349066	0.333333	6.368313	1.414711	-1.01321	-2.90264
261	4.555309	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	21	0.366519	0.35	6.392847	1.396585	-1.06387	-2.90264
262	4.572763	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	22	0.383972	0.366667	6.417058	1.377574	-1.11453	-2.90264
263	4.590216	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	23	0.401426	0.383333	6.440928	1.35768	-1.16519	-2.90264
264	4.607669	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	24	0.418879	0.4	6.464444	1.336902	-1.21585	-2.90264
265	4.625123	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	25	0.436332	0.416667	6.48759	1.315239	-1.26651	-2.90264
266	4.642576	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	26	0.453786	0.433333	6.51035	1.292692	-1.31718	-2.90264
267	4.660029	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	27	0.471239	0.45	6.532708	1.269261	-1.36784	-2.90264
268	4.677482	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	28	0.488692	0.466667	6.55465	1.244945	-1.4185	-2.90264
269	4.694936	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	29	0.506145	0.483333	6.57616	1.219746	-1.46916	-2.90264
270	4.712389	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	30	0.523599	0.5	6.597222	1.193662	-1.51982	-2.90264
271	4.729842	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	31	0.541052	0.516667	6.617822	1.166694	-1.57048	-2.90264
272	4.747296	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	32	0.558505	0.533333	6.637942	1.138842	-1.62114	-2.90264
273	4.764749	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	33	0.575959	0.55	6.657569	1.110106	-1.6718	-2.90264
274	4.782202	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	34	0.593412	0.566667	6.676687	1.080485	-1.72246	-2.90264
275	4.799655	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	35	0.610865	0.583333	6.69528	1.049981	-1.77312	-2.90264
276	4.817109	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	36	0.628319	0.6	6.713333	1.018592	-1.82378	-2.90264
277	4.834562	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	37	0.645772	0.616667	6.730831	0.986319	-1.87444	-2.90264
278	4.852015	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	38	0.663225	0.633333	6.747757	0.953161	-1.9251	-2.90264
279	4.869469	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	39	0.680678	0.65	6.764097	0.91912	-1.97576	-2.90264
280	4.886922	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	40	0.698132	0.666667	6.779835	0.884194	-2.02642	-2.90264
281	4.904375	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	41	0.715585	0.683333	6.794956	0.848384	-2.07708	-2.90264
282	4.921828	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	42	0.733038	0.7	6.809444	0.81169	-2.12774	-2.90264
283	4.939282	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	43	0.750492	0.716667	6.823284	0.774112	-2.17841	-2.90264
284	4.956735	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	44	0.767945	0.733333	6.836461	0.73565	-2.22907	-2.90264
285	4.974188	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	45	0.785398	0.75	6.848958	0.696303	-2.27973	-2.90264
286	4.991642	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	46	0.802851	0.766667	6.860761	0.656072	-2.33039	-2.90264
287	5.009095	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	47	0.820305	0.783333	6.871854	0.614957	-2.38105	-2.90264
288	5.026548	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	48	0.837758	0.8	6.882222	0.572958	-2.43171	-2.90264
289	5.044002	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	49	0.855211	0.816667	6.891849	0.530074	-2.48237	-2.90264
290	5.061455	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	50	0.872665	0.833333	6.90072	0.486307	-2.53303	-2.90264
291	5.078908	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	51	0.890118	0.85	6.908819	0.441655	-2.58369	-2.90264
292	5.096361	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	52	0.907571	0.866667	6.916132	0.396119	-2.63435	-2.90264
293	5.113815	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	53	0.925025	0.883333	6.922641	0.349699	-2.68501	-2.90264
294	5.131268	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	54	0.942478	0.9	6.928333	0.302394	-2.73567	-2.90264
295	5.148721	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	55	0.959931	0.916667	6.933192	0.254206	-2.78633	-2.90264
296	5.166175	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	56	0.977384	0.933333	6.937202	0.205133	-2.83699	-2.90264
297	5.183628	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	57	0.994838	0.95	6.940347	0.155176	-2.88765	-2.90264
298	5.201081	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	58	1.012291	0.966667	6.942613	0.104335	-2.93831	-2.90264
299	5.218534	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	59	1.029744	0.983333	6.943984	0.05261	-2.98897	-2.90264
300	5.235988	60	1.047198	5.8333333	1.666667	0	-0.55556	0	0	60	1.047198	1	6.944444	0	-3.03964	-2.90264
300	5.235988	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	0	0	0	6.944444	0	-3.03964	-336.706
301	5.253441	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	1	0.017453	0.016667	6.943691	-0.1026	-8.61821	-302.745
302	5.270894	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	2	0.034907	0.033333	6.940327	-0.29744	-13.6142	-269.945
303	5.288348	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	3	0.05236	0.05	6.93283	-0.57455	-18.0478	-238.307
304	5.305801	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	4	0.069813	0.066667	6.919849	-0.92428	-21.9394	-207.829
305	5.323254	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	5	0.087266	0.083333	6.900198	-1.33734	-25.3092	-178.512
306	5.340708	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	6	0.10472	0.1	6.87285	-1.80482	-28.1774	-150.357
307	5.358161	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	7	0.122173	0.116667	6.836931	-2.31812	-30.5644	-123.362
308	5.375614	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	8	0.139626	0.133333	6.791714	-2.86903	-32.4903	-97.5286
309	5.393067	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	9	0.15708	0.15	6.73661	-3.44968	-33.9755	-72.8562
310	5.410521	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	10	0.174533	0.166667	6.671168	-4.05256	-35.0402	-49.3448
311	5.427974	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	11	0.191986	0.183333	6.595062	-4.67049	-35.7047	-26.9945
312	5.445427	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	12	0.20944	0.2	6.508089	-5.29668	-35.9893	-5.80525
313	5.462881	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	13	0.226893	0.216667	6.410162	-5.92466	-35.9141	14.22295
314	5.480334	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	14	0.244346	0.233333	6.301304	-6.54834	-35.4996	33.0901
315	5.497787	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	15	0.261799	0.25	6.181641	-7.16197	-34.7658	50.79619
316	5.51524	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	16	0.279253	0.266667	6.051394	-7.76016	-33.7332	67.34123
317	5.532694	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	17	0.296706	0.283333	5.910879	-8.33786	-32.4219	82.72521
318	5.550147	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	18	0.314159	0.3	5.760495	-8.89039	-30.8523	96.94814
319	5.5676	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	19	0.331613	0.316667	5.600718	-9.41342	-29.0446	110.01
320	5.585054	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	20	0.349066	0.333333	5.432099	-9.90297	-27.019	121.9108
321	5.602507	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	21	0.366519	0.35	5.255255	-10.3554	-24.7958	132.6506
322	5.61996	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	22	0.383972	0.366667	5.070862	-10.7675	-22.3953	142.2293
323	5.637413	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	23	0.401426	0.383333	4.879651	-11.1362	-19.8378	150.6469
324	5.654867	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	24	0.418879	0.4	4.6824	-11.4592	-17.1435	157.9035
325	5.67232	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	25	0.436332	0.416667	4.479931	-11.734	-14.3327	163.9991
326	5.689773	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	26	0.453786	0.433333	4.273097	-11.9589	-11.4256	168.9336
327	5.707227	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	27	0.471239	0.45	4.062785	-12.1324	-8.44258	172.707
328	5.72468	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	28	0.488692	0.466667	3.849903	-12.2533	-5.40378	175.3194
329	5.742133	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	29	0.506145	0.483333	3.635376	-12.3208	-2.32953	176.7707
330	5.759587	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	30	0.523599	0.5	3.420139	-12.3345	0.759922	177.061
331	5.77704	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	31	0.541052	0.516667	3.205134	-12.2943	3.844308	176.1902
332	5.794493	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	32	0.558505	0.533333	2.991299	-12.2005	6.903364	174.1583
333	5.811946	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	33	0.575959	0.55	2.779566	-12.0536	9.916825	170.9654
334	5.8294	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	34	0.593412	0.566667	2.570852	-11.8547	12.86443	166.6115
335	5.846853	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	35	0.610865	0.583333	2.366055	-11.605	15.72591	161.0964
336	5.864306	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	36	0.628319	0.6	2.166045	-11.3064	18.481	154.4204
337	5.88176	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	37	0.645772	0.616667	1.971662	-10.9607	21.10944	146.5833
338	5.899213	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	38	0.663225	0.633333	1.783706	-10.5704	23.59097	137.5851
339	5.916666	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	39	0.680678	0.65	1.602931	-10.1382	25.90531	127.4258
340	5.934119	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	40	0.698132	0.666667	1.430043	-9.66718	28.03221	116.1056
341	5.951573	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	41	0.715585	0.683333	1.265688	-9.16086	29.9514	103.6242

342	5.969026	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	42	0.733038	0.7	1.110452	-8.62301	31.64262	89.98181
343	5.986479	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	43	0.750492	0.716667	0.964848	-8.05777	33.08561	75.17835
344	6.003933	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	44	0.767945	0.733333	0.829315	-7.46966	34.26009	59.21385
345	6.021386	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	45	0.785398	0.75	0.704212	-6.86355	35.14581	42.08828
346	6.038839	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	46	0.802851	0.766667	0.589807	-6.24464	35.72249	23.80166
347	6.056293	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	47	0.820305	0.783333	0.486275	-5.61851	35.96989	4.353986
348	6.073746	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	48	0.837758	0.8	0.393691	-4.99109	35.86772	-16.2547
349	6.091199	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	49	0.855211	0.816667	0.312024	-4.36865	35.39573	-38.0245
350	6.108652	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	50	0.872665	0.833333	0.241129	-3.75782	34.53366	-60.9554
351	6.126106	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	51	0.890118	0.85	0.180744	-3.16558	33.26123	-85.0473
352	6.143559	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	52	0.907571	0.866667	0.130479	-2.59928	31.5582	-110.3
353	6.161012	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	53	0.925025	0.883333	0.089816	-2.06662	29.40428	-136.714
354	6.178466	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	54	0.942478	0.9	0.058098	-1.57562	26.77921	-164.289
355	6.195919	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	55	0.959931	0.916667	0.034525	-1.1347	23.66274	-193.025
356	6.213372	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	56	0.977384	0.933333	0.018147	-0.75261	20.0346	-222.923
357	6.230825	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	57	0.994838	0.95	0.007859	-0.43846	15.87452	-253.981
358	6.248279	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	58	1.012291	0.966667	0.002392	-0.2017	11.16224	-286.2
359	6.265732	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	59	1.029744	0.983333	0.000311	-0.05215	5.8775	-319.58
360	6.283185	60	1.047198	6.9444444	0	-1.66667	-64.4444	99.16667	-40	60	1.047198	1	4.78E-06	1.4E-05	2.8E-05	-354.122


Polynomial Displacement
8
6
4
2
0
0
30
60
90
120
150
180
210
240
270
300
330
360


Polynomial Velocity
4
2
0
-2
-4
-6
-8
-10
-12
-14
0
30
60
90
120
150
180
210
240
270
300
330
360


Polynomial Acceleration
40
30
20
10
0
-10
-20
-30
-40
0
30
60
90
120
150
180
210
240
270
300
330
360


Polynomial Jerk
300
200
100
0
-100
-200
-300
-400
0
30
60
90
120
150
180
210
240
270
300
330
360