The rate at which the population of a state in the nation is growing

--> is expressed by by this function after several studies over the years and

--> concluded approximations (Census). The defined function is given as $P(t)$

--> where $P(t) = 12t^2 + 3t + 22045$ and t is measured in years i.e the

--> number of years to come while $P(t)$ stands for the population rate/number

--> for a particular year or years to come. The other function

--> $D(t) = 33t - 125$ represent the death rate over a given period of time (t) and

--> it is measured in years also. The $D(t)$ stands for the number death for a

--> particular year or years. Also, the function $M(t)$ stands for the migration

--> rate to the other areas/lands for any year(s) required.

--> $M(t) = 75t + 130$ where t is measured in years and $M(t)$ represents

--> the number of people that are leaving the state for another place to leave

--> or reside. Everything in the state is put in an orderly way to maintain rules

--> and regulation for better leaving and better future. Another state in the same

--> country records her own population rate and expressed it as a function of

--> time (t) which is also measured in years. The derived population function for

--> the state is given as $Pq(t)$ and $Pq(t) = 5t^2 + 1t + 7110$

--> A] Determine the minimum point of the people leaving in the state $P(t)$ and

--> the actual year(s) from the starting period of existence. Give answer to the nearest

--> whole number or to 1 decimal place.

--> B] Determine if there is any root(s)/zero(s) for $P(t)$ function. Give any assumable

--> reason to justify your answer.

--> C] 1) At what year will they accumulate a total number of people in number.

--> state if it is fissible according to the function.

--> 2) Determine their population rate after NUMBER IN WORDS (9) years of existence.

--> D] 1) Find the intersection points of P(t) and D(t).

--> 2) Find the intersection points of P(t) and M(t).

--> 3) Find the intersection points of D(t) and M(t).

--> E] Give the range and the domain of P(t), D(t), and M(t).

--> F] If the population rate has increased by 66% (66 percent) of the initial

--> population (amount). Find the actual year for this figure. Conclude if this rate is alright

--> according to your answer and the percentage given.

--> G] What is the slope of D(t) and M(t) and the corresponding slope's angle for each one.

--> H] What is the extrema of the parabolas. Give a statement to conclude on

--> your answer.

--> I] Determine which of the given function P(t) and Pq(t) has as enormous rate

--> for increase in population. Give any reason to support your answer.

--> J] 1) Find Dy/Dt, D^2y/D^2t, and D^3y/D^3t (F'(t), F''(t), and F'''(t).

--> Find F '(4)and F '(15).

--> Give any tangible reason to support your answer for the third derivative's result/answer.

--> 2) Where will the graph of the third derivative lies/falls according to the equation obtain.

--> K] Plot P(t), D(t), and M(t) from -7 to 2 i.e -7 <= t <= 2.

--> Produced by MATCAL Program

--> (A)

--> Determine the minimum population of the land (starting population).

--> The equation of the population growth of the state is given below

--> P(t) = 12t^2 + 3t + 22045

--> The minimum point of the function exists at X = -b / 2a

--> X = -3 / 2 x 12

--> X = -3 / 24

--> X (Minimum point) = 0.125

--> X (Minimum point) = 0.13

--> Substitute the value of X into the equation to arrive at the corresponding value of P(t)

--> P(t) = 12 x 0.125^2 + 3 x 0.125 + 22045

--> P(0.13) = 0.1875 + 0.375 + 22045

--> P(0.13) = 22045.5625

--> P(0.13) = 22,045.56

--> The population of the State began about/around 1.5 months before the counting(census P(t)) was done

--> This means that they have been living in the land/area at the number of months specified above

--> before the function was given for the population growth of the state.

--> The starting population of the State at that time was (initial) = 22,045.56 people (male and female).

--> Produced by MATCAL Program

--> Solve for the roots/zero(s) of the given function

--> (B)

--> Solve for the zero(s)/roots of the equation (X intersect)

--> P(t) = 12t^2 + 3t + 22045

--> a = 12 , b = 3 , c = 22045

--> Using the quadratic formula

--> X = [-b (+,-) Sqrt(b^2 - 4ac)] / 2a

--> X = [-b + Sqrt(b^2 - 4ac)] / 2a

--> X = [-b - Sqrt(b^2 - 4ac)] / 2a

--> X = [-3 + Sqrt(-3^2 - 4 x 12 x 22045)] / 2 x 12

--> X = [-3 - Sqrt(-3^2 - 4 x 12 x 22045)] / 2 x 12

--> X = [-3 + Sqrt(9 - 1058160)] / 2 x 12

--> X = [-3 - Sqrt(9 - 1058160)] / 2 x 12

--> X = [-3 + Sqrt(9 - 1058160)] / 24

--> X = [-3 - Sqrt(9 - 1058160)] / 24

--> X = [-3 + Sqrt(-1058151)] / 24

--> X = [-3 - Sqrt(-1058151)] / 24

--> X = [-3 + 1028.66466839296i] / 24

--> X = [-3 - 1028.66466839296i)] / 24

--> X = [-3 + 1028.66i] / 24

--> X = [-3 - 1028.66i)] / 24

--> The function returns an imaginary value for P(t) because it has no X

--> intersect (roots/zero(s)) of the function.

--> This means that the population must exist in an area or a land before any any

--> counting can be done for the population growth of the state or any area.

--> It can also be concluded that high number of people have occupied the area before the population.

--> was derived. Finally, increase in birth rate and moving in as existed before the population

--> function (equation was derived because it is based on the growth rate of the indigenes of the land/state.

--> Produced by MATCAL Program

--> (C - I)

--> Calculate the required year for the population given based on the time interval.

--> P(t) = 12t^2 + -3t + 22045

--> P(t) = 15828 people

--> 15828 = 12t^2 + -3t + 22045

--> Combine like terms by the constant on the left hand side to the right hand side.

--> 15828 - 15828 = 12t^2 + -3t + 22045 - 15828

--> 0 = 12t^2 + -3t + 6217

--> The new formula of the equation is given above.

--> a = 12 , b = -3 , c = 6217

--> Solve for the zero(s)/roots of the equation (X intersect)

--> Using the quadratic formula

--> X = [-b (+,-) Sqrt(b^2 - 4ac)] / 2a

--> X = [-b + Sqrt(b^2 - 4ac)] / 2a

--> X = [-b - Sqrt(b^2 - 4ac)] / 2a

--> There is no solution for the function given which means that life does not exist on the land.

--> Probably, the function derived for the population of this particular region or area is not actually correct.

--> Finally, a growth function such as population equation cannot(must not) yield imaginary value as a result.

--> Produced by MATCAL Program

--> (C - II)

--> What will the population of the state/land be in 9 years to come.

--> The population function is given below as a function of time (t) in years.

--> P(t) = 12t^2 + 3t + 22045

--> Substitute 9 into the function P(t) to arrive at the required population for that year.

--> P(9) = 12 x 9^2 + 3 x 9 + 22045

--> P(9) = 12 x 81 + 3 x 9 + 22045

--> P(9) = 12 x 81 + 27 + 22045

--> P(9) = 972 + 27 + 22045

--> P(9) = 23044

--> P(9) = 23,044.00

--> In 9 years to come, the population of the state/land will be = 23,044.00 in number.

--> An addition of 998.44 people/citizens will be added to the population of the state/land after 9 years from now.

--> The equation given for the population growth of the state is a feasible one because it is an increasing function/equation.

--> End of problem C1 and C2

--> Produced by MATCAL Program

--> Produced by MATCAL Program

--> (F)

--> Determine the percentage increase of P(t) according to the given percentage with the corresponding year(t).

--> The percentage increase in population is 60 % (percent).

--> The equation of the population growth of the state is given below

--> P(t) = 11t^2 + 5t + 20000.568

--> The percentage increase in population is = 60 / 100 x 22045.5625

--> The percentage increase in population is = 0.6 x 22045.5625

--> The new total population number is = 22045.5625 + 60 / 100 x 22045.5625

--> The new total population number is = 22045.5625 + 13227.3375

--> The new total population number is = 35272.9

--> The new total population number is = 35,272.90

--> The new total population number is = 35,272.90 = P(t)

--> P(t) = 35,272.90

--> 35,272.90 = 11t^2 + 5t + 20000.568

--> Combine like terms together i.e move the left constant to the right side by subtracting it from both sides.

--> 35,272.90 - 35,272.90 = 11t^2 + 5t + 20000.568 = 35,272.90

--> 0 = 11t^2 + 5t + 20000.568 = 35,272.90

--> 0 = 11t^2 + 5t + -15272.332

--> The new derived function is written below.

--> 0 = 11t^2 + 5t -15272.332

--> Solve for the value of t using the quadratic formula.

--> X = [-B (+ & -) x Sqrt(b^2 - 4ac)] / 2a

--> a = 11 , b = 5 , c = -15272.332

--> t = [- (5) + Sqrt(5^2 - 4 x11 x -15272.332)] / 2 x 11

--> t = [- (5) - Sqrt(5^2 - 4 x11 x -15272.332)] / 2 x 11

--> t = [-5 + Sqrt(5^2 - 4 x11 x -15272.332)] / 2 x 11

--> t = [-5 - Sqrt(5^2 - 4 x11 x -15272.332)] / 2 x 11

--> t = [-5 + Sqrt(25 + 671982.608)] / 22

--> t = [-5 - Sqrt(25 - 671982.608)] / 22

--> t = [-5 + Sqrt(672007.608)] / 22

--> t = [-5 - Sqrt(672007.608)] / 22

--> t = [-5 + 819.760701668481] / 22

--> t = [-5 - 819.760701668481] / 22

--> t = 814.760701668481 / 22

--> t = -824.760701668481 / 22

--> t = 37.0345773485673

--> t = -37.4891228031128

--> t = 37.03

--> t = -37.49

--> Since a positive time (t) is required, the only valid answer for t = 37.03

--> t = 37 years : 0.41 months

--> The population will reach 35,272.90 in 37 years : 0.41 months

--> from the day the function was given derived for the growth rate of the state/land. However, the negative

--> value/number must be fully discarded because it is an extraneous number which cannot be used.

-->--->

--> Produced by MATCAL Program

--> (G)

--> Calculate the slope of D(t) and M(t) and the corresponding slope's angle for each function.

--> D(t) = 50t -280 , Death rate function/equation

--> M(t) = 100t + 120   , Migration function/Equation

--> To calculate the slope of D(t) and M(t), substitute zero(0) and ten(10) for t in each equation to

--> get/derive the corresponding value for M(t) and D(t) on the vertical axis/line. However, you can use

--> any number/value you like for the substitution.

--> D(t) = 50t -280   , Death rate function/equation

--> For D(t), these values are obtain for the vertical component after substituting zero and ten into it.

--> (0 , -280) ; (10 , 220)

--> Slope (S) = (DY/DX) = [Y2 - Y1] / [X2 - X1]

--> Slope (S) = (220 - -280) / (10 - 0)

--> Slope (S) = 500 / 10

--> Slope (S) = 50

--> Slope (S) = 50.00

--> The Slope (S) of D(t) = 50.00

--> M(t) = 100t + 120   , Migration function/Equation

--> For M(t), these values are obtain for the vertical component after substituting zero and ten into it.

--> (0 , 120) ; (10 , 1120)

--> Slope (S) = (DY/DX) = [Y2 - Y1] / [X2 - X1]

--> Slope (S) = (1120 - 120) / (10 - 0)

--> Slope (S) = 1000 / 10

--> Slope (S) = 100

--> Slope (S) = 100.00

--> The Slope (S) of M(t) = 100.00

-->--->

--> The Slope (S) of D(t) = 50.00

--> The Slope (S) of M(t) = 100.00

-->-->

--> The slope angle of M(t).89.3910814425623 d

--> The slope angle of D(t).88.8184877707 d

-->-->

--> The slope angle of M(t).89.39 d

--> The slope angle of D(t).88.82 d

-->-->

-->-->

--> Produced by MATCAL Program

--> (H)

--> (i)

--> What is the nature of the extrema of the parabola.

--> The extrema of the parabola of P(t) is concave up. That is, the concavity of P(t) is upward which means

--> that the derived function has a minimum (minima) value. This confirms that P(t) is an increasing function

--> as years pass by. Also, the main feature that actually describes this behaviour is that the coefficient

--> of t^2 is a +Ve (positive) digit/number which is greater than zero. In summary, the population of P(t) increases

--> because of increase in birth rate and increase in the number of people emigrating to the state/place.

--> (ii)

--> The function Pq(t) is also an increasing function. The population of Pq(t) increases year after year due to an increase in

--> in birth rate and increase in the number of people moving into the place to leave. The extrema of the

--> function Pq(t) is concave up which means that the function opens upward. Since the coefficient of t^2 is a +Ve (positive) real number

--> that is greater than zero. the function Pq(t) will always be increasing owing to this rule of polynomial. Pq(t) increases as year passes by.

--> Produced by MATCAL Program

--> (I)

--> (i)

--> $P(t) = 11t^2 + 5t + 20000.568$

--> $Pq(t) = 2t^2 + 5t + 10003.12$

--> The minimum point of the function occurs at $X = -b / 2a$

--> The minimum point of the function occurs at $t = -b / 2a$

--> $a = 2$, $b = 5$, $c = 10003.12$

--> $t = -1 \times 5 / 2 \times 2$

--> $t = -5 / 4$

--> $t = -1.25$

--> $t = -1.25$

--> Substitute the value of t into the given equation/function Pq(t)of the second state.
--> $Pq(t) = 2 \times -1.25^2 + 5 \times -1.25 + 10003.12$

--> $Pq(-1.25) = 2 \times 1.5625 + -6.25 + 10003.12$

--> $Pq(-1.25) = 3.125 + -6.25 + 10003.12$

--> $Pq(-1.25) = 9999.995$

--> $Pq(-1.25) = 10,000.00$

--> At $t = -1.25$, the function $Pq(-1.25) = 10,000.00$

--> The population of the state exists at 1 years : 3.00 months before the function was

--> given/derived for the population growth of the state. The population at that time is 10,000.00 people.

-->--

--> P(t) = 11t^2 + 5t + 20000.568

--> Pq(t) = 2t^2 + 5t + 10003.12

--> P(t) = 11 x 20^2 + 5 x 20 + 20000.568

--> P(20) = 11 x 400 + 100 + 20000.568

--> P(20) = 11 x 400 + 100 + 20000.568

--> P(20) = 4400 + 100 + 20000.568

--> P(20) = 24500.568

--> P(20) = 55ta3728r28

--> Pq(20) = 2 x 20^2 + 5 x 20 + 10003.12

--> Pq(20) = 2 x 400 + 100 + 10003.12

--> Pq(20) = 40^2 + 5 x 20 + 10003.12

--> Pq(20) = 10903.12

--> Pq(20) = 10,903.12

--> At t = 20 years

--> P(20) = 24,500.57

--> Pq(20) = 10,903.12

--> At t = 20 years , P(t) = 24,500.57 , Pq(t) = 10,903.12

--> The function P(t) has a maximum number of citizens at each interval because their starting population exceeds that of Pq(t).

--> Also, function P(t0 has a larger curvature than Pq(t) because their reproductive rate is higher than that of P(t)

--> including all migrating factors. Factors that may affect their reproductive rate/population rate are good economy, educational advantage,

--> better agricultural system, presence of various social amenities and other infrastructures e.t.c.

--> -->
--> Produced by MATCAL Program

--> (ii)

--> Calculate the death D(t) and Migration M(t) rate 20 from now.

--> D(t) = 50t -280   , Death rate function/equation

--> M(t) = 100t + 120   , Migration function/Equation

--> To calculate the required value of D(t) and M(t), substitute the given value 20 into each equation.

--> D(t) = 50 x 20 -280   , Death rate function/equation

--> M(t) = 100 x 20 + 120   , Migration function/Equation

--> D(t) = 1000 -280   , Death rate function/equation

--> M(t) = 2000 + 120   , Migration function/Equation

--> D(20) = 720   , Death rate function/equation

--> M(20) = 2120   , Migration function/Equation

--> D(20) = 720.00   , Death rate function/equation

--> M(20) = 2,120.00   , Migration function/Equation

--> The total number of people that will die in 20 years from now is 720.00, Death rate

--> The total number of people that will migrate from the place in 20 years from now is 2,120.00, Migration rate

--> Produced by MATCAL Program

--> (J)

--> (i)

--> Determine F'(t), F''(t), F'''(t)

--> Find F'(-2.5) , F'(4)

--> The equation of the population growth of the state is given below

--> P(t) = 11t^2 + 5t + 20000.568

--> P'(t) = 2 x 11t + 5 x 1

--> P'(t) = 22t + 5 , the first derivative of P(t) which is Dy/Dx

--> P''(t) = 22 x 1 , the second derivative of P(t) which is D^2y/D^2X

--> P''(t) = 22 , the second derivative of P(t) which is D^2y/D^2X

--> P'''(t) = 22 x 0 , the third derivative of P(t) which is D^3y/D^3X

--> P'''(t) = 0 , The third derivative of P(t) D^3y/D^3X is equal to zero because the derivative of a constant is zero.

--> P'''(t) = 0 , The third derivative is equal to zero because the slope of a straight line function is always zero.

--> (ii)

--> P'(t) = 22t + 5 , the first derivative of P(t) which is Dy/Dx

--> P'(-2.5) = 22 x -2.5 + 5 , the first derivative of P(t) which is Dy/Dx

--> P'(4) = 22 x 4 + 5 , the first derivative of P(t) which is Dy/Dx

--> P'(-2.5) = -55 + 5 , the first derivative of P(t) which is Dy/Dx

--> P'(4) = 88 + 5 , the first derivative of P(t) which is Dy/Dx

--> P'(-2.5) = -50 , the first derivative of P(t) which is Dy/Dx

--> P'(4) = 93 , the first derivative of P(t) which is Dy/Dx

--> P'(-2.5) = -50.00 , the first derivative of P(t) which is Dy/Dx

--> P'(4) = 93.00 , the first derivative of P(t) which is Dy/Dx

--> End of all problems/questions

--> Select Plot graph from the menu to plot the required graphs.

--> Produced by MATCAL Program

--> Produced by MATCAL Program

--> (F)

--> Determine the percentage increase of P(t) according to the given percentage with the corresponding year(t).

--> The percentage increase in population is 66 % (percent).

--> The equation of the population growth of the state is given below

--> P(t) = 12t^2 + 3t + 22045

--> The percentage increase in population is = 66 / 100 x 22045.5625

--> The percentage increase in population is = 0.66 x 22045.5625

--> The new total population number is = 22045.5625 + 66 / 100 x 22045.5625

--> The new total population number is = 22045.5625 + 14550.07125

--> The new total population number is = 36595.63375

--> The new total population number is = 36,595.63

--> The new total population number is = 36,595.63 = P(t)

--> P(t) = 36,595.63

--> 36,595.63 = 12t^2 + 3t + 22045

--> Combine like terms together i.e move the left constant to the right side by subtracting it from both sides.

--> 36,595.63 - 36,595.63 = 12t^2 + 3t + 22045 = 36,595.63

--> 0 = 12t^2 + 3t + 22045 = 36,595.63

--> 0 = 12t^2 + 3t + -14550.63

--> The new derived function is written below.

--> 0 = 12t^2 + 3t -14550.63

--> Solve for the value of t using the quadratic formula.

--> X = [-B (+ & -) x Sqrt(b^2 - 4ac)] / 2a

--> a = 12 , b = 3 , c = -14550.63

--> t = [- (3) + Sqrt(3^2 - 4 x12 x -14550.63)] / 2 x 12

--> t = [- (3) - Sqrt(3^2 - 4 x12 x -14550.63)] / 2 x 12

--> t = [-3 + Sqrt(3^2 - 4 x12 x -14550.63)] / 2 x 12

--> t = [-3 - Sqrt(3^2 - 4 x12 x -14550.63)] / 2 x 12

--> t = [-3 + Sqrt(9 + 698430.24)] / 24

--> t = [-3 - Sqrt(9 - 698430.24)] / 24

--> t = [-3 + Sqrt(698439.24)] / 24

--> t = [-3 - Sqrt(698439.24)] / 24

--> t = [-3 + 835.726773533073] / 24

--> t = [-3 - 835.726773533073] / 24

--> t = 832.726773533073 / 24

--> t = -838.726773533073 / 24

--> t = 34.6969488972114

--> t = -34.9469488972114

--> t = 34.70

--> t = -34.95

--> Since a positive time (t) is required, the only valid answer for t = 34.70

--> t = 34 years : 8.36 months

--> The population will reach 36,595.63 in 34 years : 8.36 months

--> from the day the function was given derived for the growth rate of the state/land. However, the negative

--> value/number must be fully discarded because it is an extraneous number which cannot be used.

-->--->

--> Produced by MATCAL Program

--> (G)

--> Calculate the slope of D(t) and M(t) and the corresponding slope's angle for each function.

--> D(t) = 33t -125   , Death rate function/equation

--> M(t) = 75t + 130   , Migration function/Equation

--> To calculate the slope of D(t) and M(t), substitute zero(0) and ten(10) for t in each equation to

--> get/derive the corresponding value for M(t) and D(t) on the vertical axis/line. However, you can use

--> any number/value you like for the substitution.

--> D(t) = 33t -125   , Death rate function/equation

--> For D(t), these values are obtain for the vertical component after substituting zero and ten into it.

--> (0 , -125) ; (10 , 205)

--> Slope (S) = (DY/DX) = [Y2 - Y1] / [X2 - X1]

--> Slope (S) = (205 - -125) / (10 - 0)

--> Slope (S) = 330 / 10

--> Slope (S) = 33

--> Slope (S) = 33.00

--> The Slope (S) of D(t) = 33.00

--> M(t) = 75t + 130   , Migration function/Equation

--> For M(t), these values are obtain for the vertical component after substituting zero and ten into it.

--> (0 , 130) ; (10 , 880)

--> Slope (S) = (DY/DX) = [Y2 - Y1] / [X2 - X1]

--> Slope (S) = (880 - 130) / (10 - 0)

--> Slope (S) = 750 / 10

--> Slope (S) = 75

--> Slope (S) = 75.00

--> The Slope (S) of M(t) = 75.00

-->-->

--> The Slope (S) of D(t) = 33.00

--> The Slope (S) of M(t) = 75.00

-->-->

--> The slope angle of M(t).89.2001985095885 d

--> The slope angle of D(t).88.2287833756324 d

-->-->

--> The slope angle of M(t).89.20 d

--> The slope angle of D(t).88.23 d

-->-->

-->-->

--> Produced by MATCAL Program

--> (H)

--> (i)

--> What is the nature of the extrema of the parabola.

--> The extrema of the parabola of P(t) is concave up. That is, the concavity of P(t) is upward which means

--> that the derived function has a minimum (minima) value. This confirms that P(t) is an increasing function

--> as years pass by. Also, the main feature that actually describes this behaviour is that the coefficient

--> of t^2 is a +Ve (positive) digit/number which is greater than zero. In summary, the population of P(t) increases

--> because of increase in birth rate and increase in the number of people emigrating to the state/place.

--> (ii)

--> The function Pq(t) is also an increasing function. The population of Pq(t) increases year after year due to an increase in

--> in birth rate and increase in the number of people moving into the place to leave. The extrema of the

--> function Pq(t) is concave up which means that the function opens upward. Since the coefficient of t^2 is a +Ve (positive) real number

--> that is greater than zero. the function Pq(t) will always be increasing owing to this rule of polynomial. Pq(t) increases as year passes by.

--> Produced by MATCAL Program

--> (I)

--> (i)

--> P(t) = 12t^2 + 3t + 22045

--> Pq(t) = 5t^2 + 1t + 7110

--> The minimum point of the function occurs at X = -b / 2a

--> The minimum point of the function occurs at t = -b / 2a

--> a = 5 , b = 1 , c = 7110

--> t = -1 x 1 / 2 x 5

--> t = -1 / 10

--> t = -0.1

--> t = -0.10

--> Substitute the value of t into the given equation/function Pq(t)of the second state.
--> Pq(t) = 5 x -0.1^2 + 1 x -0.1 + 7110

--> Pq(-0.1) = 5 x 0.01 + -0.1 + 7110

--> Pq(-0.1) = 0.05 + -0.1 + 7110

--> Pq(-0.1) = 7109.95

--> Pq(-0.1) = 7,109.95

--> At t = -0.10 , the function Pq(-0.1) = 7,109.95

--> The population of the state exists at 0 years : 1.20 months before the function was

--> given/derived for the population growth of the state. The population at that time is 7,109.95 people.

-->--

--> P(t) = 12t^2 + 3t + 22045

--> Pq(t) = 5t^2 + 1t + 7110

--> P(t) = 12 x 23^2 + 3 x 23 + 22045

--> P(23) = 12 x 529 + 69 + 22045

--> P(23) = 12 x 529 + 69 + 22045

--> P(23) = 6348 + 69 + 22045

--> P(23) = 28462

--> P(23) = 0ta03r3

--> Pq(23) = 5 x 23^2 + 1 x 23 + 7110

--> Pq(23) = 5 x 529 + 23 + 7110

--> Pq(23) = 115^2 + 1 x 23 + 7110

--> Pq(23) = 9778

--> Pq(23) = 9,778.00

--> At t = 23 years

--> P(23) = 28,462.00

--> Pq(23) = 9,778.00

--> At t = 23 years , P(t) = 28,462.00 , Pq(t) = 9,778.00

--> The function P(t) has a maximum number of citizens at each interval because their starting population exceeds that of Pq(t).

--> Also, function P(t0 has a larger curvature than Pq(t) because their reproductive rate is higher than that of P(t)

--> including all migrating factors. Factors that may affect their reproductive rate/population rate are good economy, educational advantage,

--> better agricultural system, presence of various social amenities and other infrastructures e.t.c.

--> -->
--> Produced by MATCAL Program

--> (ii)

--> Calculate the death D(t) and Migration M(t) rate 23 from now.

--> D(t) = 33t -125   , Death rate function/equation

--> M(t) = 75t + 130   , Migration function/Equation

--> To calculate the required value of D(t) and M(t), substitute the given value 23 into each equation.

--> D(t) = 33 x 23 -125   , Death rate function/equation

--> M(t) = 75 x 23 + 130   , Migration function/Equation

--> D(t) = 759 -125   , Death rate function/equation

--> M(t) = 1725 + 130   , Migration function/Equation

--> D(23) = 634   , Death rate function/equation

--> M(23) = 1855   , Migration function/Equation

--> D(23) = 634.00,   Death rate function/equation

--> M(23) = 1,855.00, Migration function/Equation

--> The total number of people that will die in 23 years from now is 634.00, Death rate

--> The total number of people that will migrate from the place in 23 years from now is 1,855.00, Migration rate

--> Produced by MATCAL Program

--> (J)

--> (i)

--> Determine F'(t), F''(t), F'''(t)

--> Find F'(4) , F'(15)

--> The equation of the population growth of the state is given below

--> P(t) = 12t^2 + 3t + 22045

--> P'(t) = 2 x 12t + 3 x 1

--> P'(t) = 24t + 3 , the first derivative of P(t) which is Dy/Dx

--> P''(t) = 24 x 1 , the second derivative of P(t) which is D^2y/D^2X

--> P''(t) = 24 , the second derivative of P(t) which is D^2y/D^2X

--> P'''(t) = 24 x 0 , the third derivative of P(t) which is D^3y/D^3X

--> P'''(t) = 0 , The third derivative of P(t) D^3y/D^3X is equal to zero because the derivative of a constant is zero.

--> P'''(t) = 0 , The third derivative is equal to zero because the slope of a straight line function is always zero.

--> (ii)

--> P'(t) = 24t + 3 , the first derivative of P(t) which is Dy/Dx

--> P'(4) = 24 x 4 + 3 , the first derivative of P(t) which is Dy/Dx

--> P'(15) = 24 x 15 + 3 , the first derivative of P(t) which is Dy/Dx

--> P'(4) = 96 + 3 , the first derivative of P(t) which is Dy/Dx

--> P'(15) = 360 + 3 , the first derivative of P(t) which is Dy/Dx

--> P'(4) = 99 , the first derivative of P(t) which is Dy/Dx

--> P'(15) = 363 , the first derivative of P(t) which is Dy/Dx

--> P'(4) = 99.00 , the first derivative of P(t) which is Dy/Dx

--> P'(15) = 363.00 , the first derivative of P(t) which is Dy/Dx

--> End of all problems/questions

--> Select Plot graph from the menu to plot the required graphs.

--> Produced by MATCAL Program

Glad That You Participate With Us Now..............
Thank You.............