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**SEMESTER TWO**

**MATHEMATICS**

**METHODS**

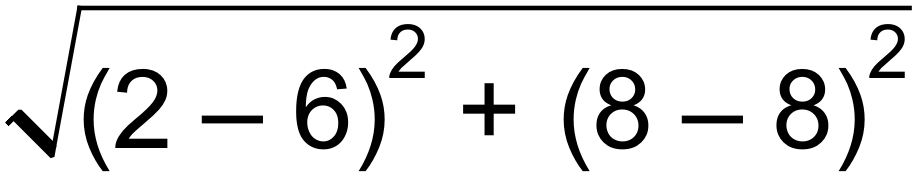
**UNITS 1 and 2**

**2017**

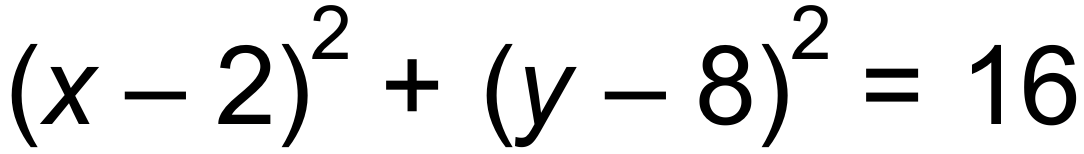
**SOLUTIONS**

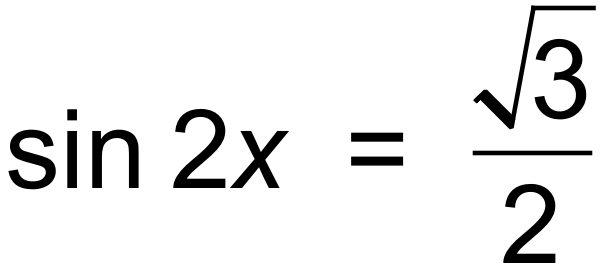
***Calculator−free Solutions***

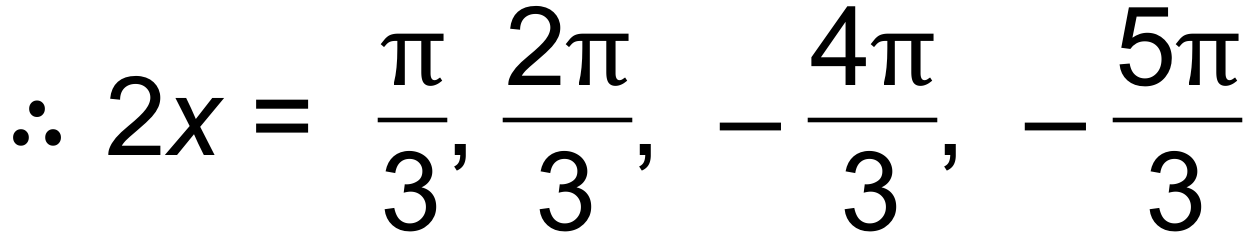
1. Origin is at (2, 8)

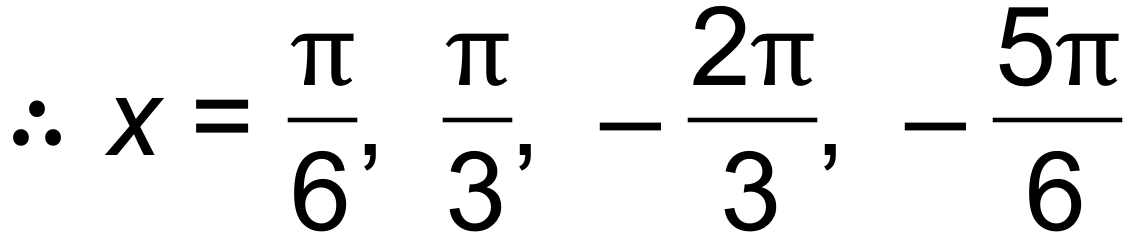
Radius = 

= 4 ✓

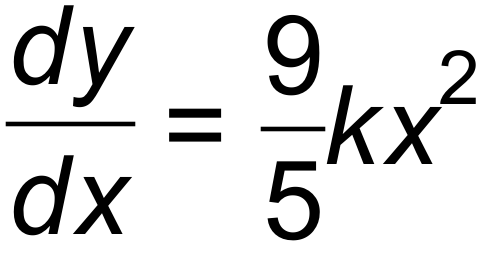
 ✓ [2]

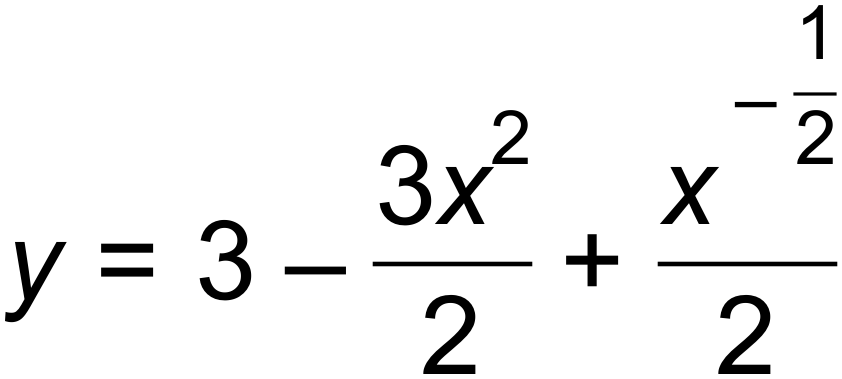
2. (a)  ✓

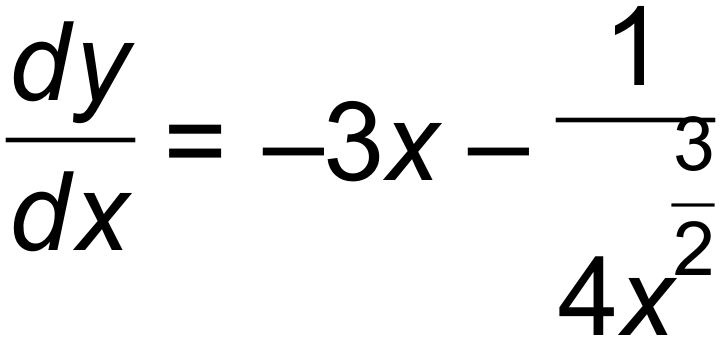
 ✓

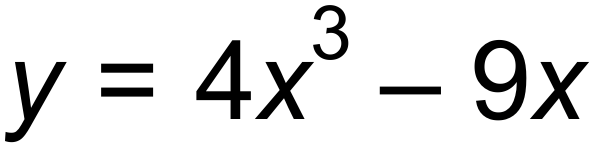
 ✓

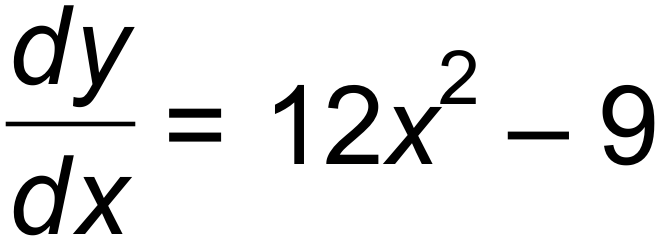
(b) cos *x* cannot be more than 1. ✓ [4]

3. (a)  ✓✓

(b)  ✓

 ✓✓

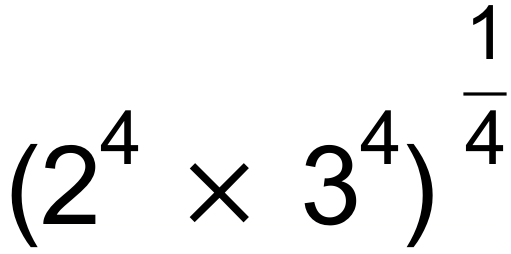
(c)  ✓

 ✓ [7]

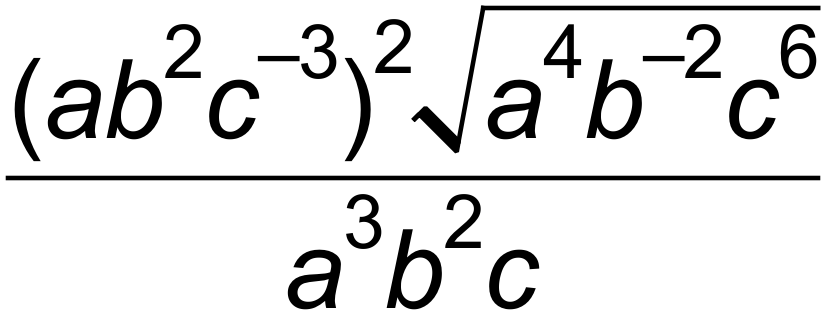
|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| D | A | B | C |

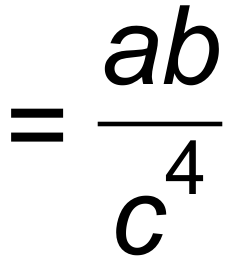
4.

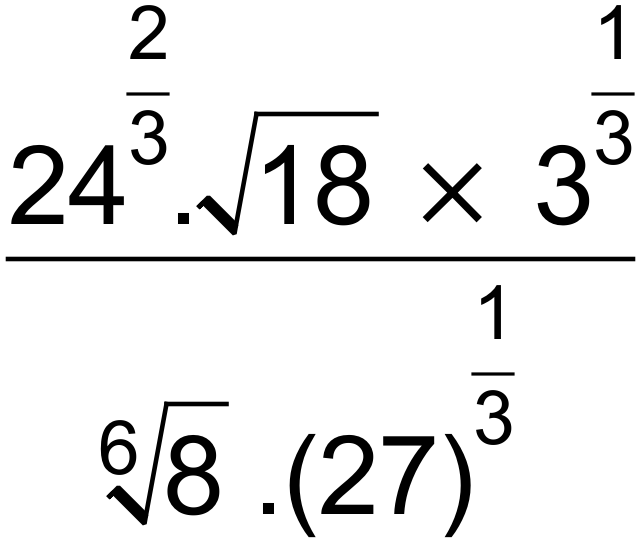
✓✓✓✓ [4]

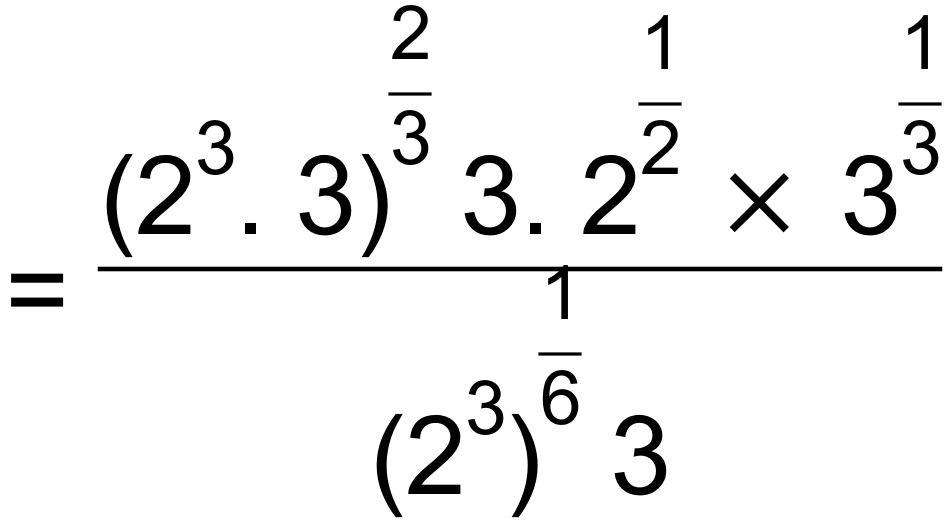
5. (a) (i) 

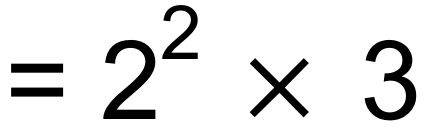
= 6 ✓

(ii) 

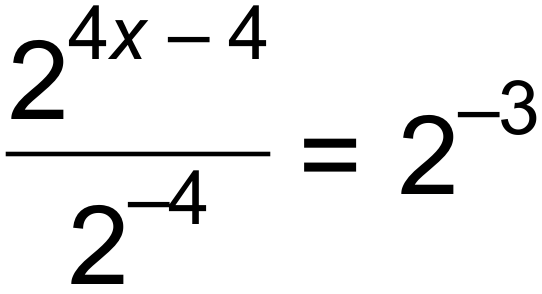
 ✓✓

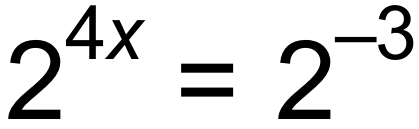
(iii) 

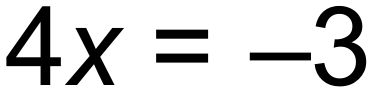
 ✓✓

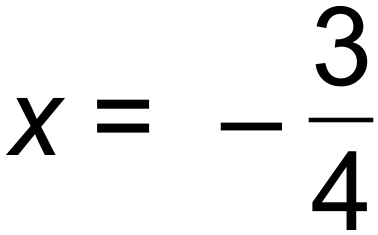


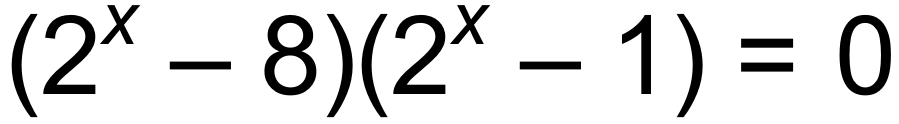
= 12 ✓

(b) (i)  ✓

 ✓



 ✓

(ii) ****

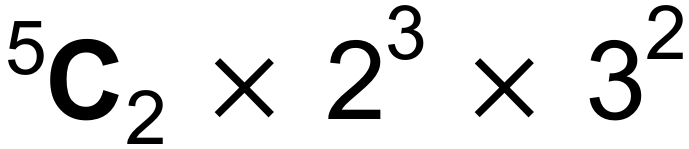
 ✓

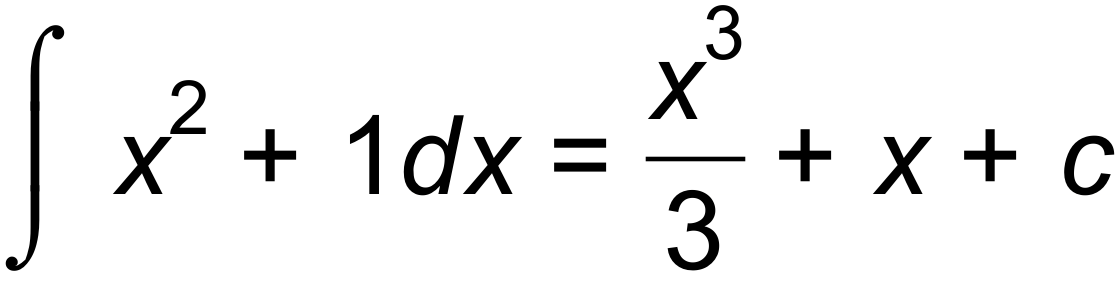
 ✓ [11]

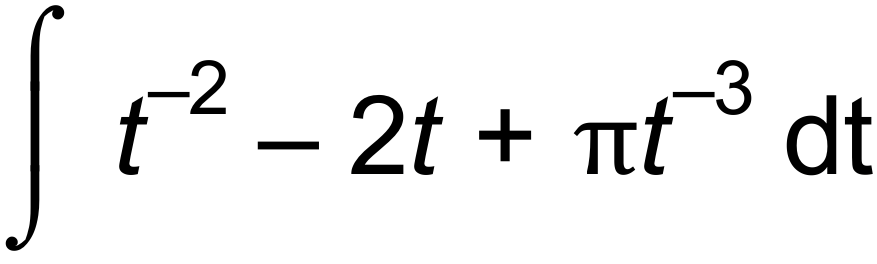
6. (a) (i) 0.2 ✓

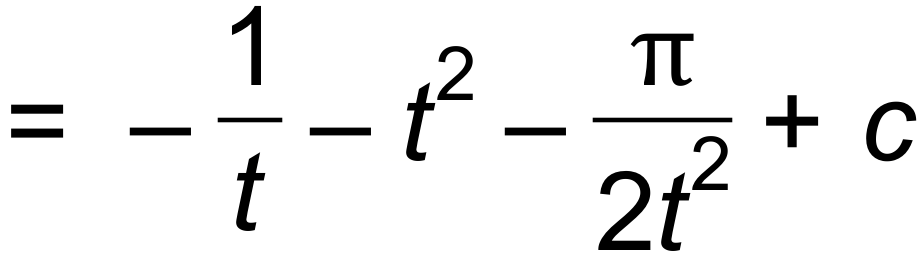
(ii) 0.4 ✓

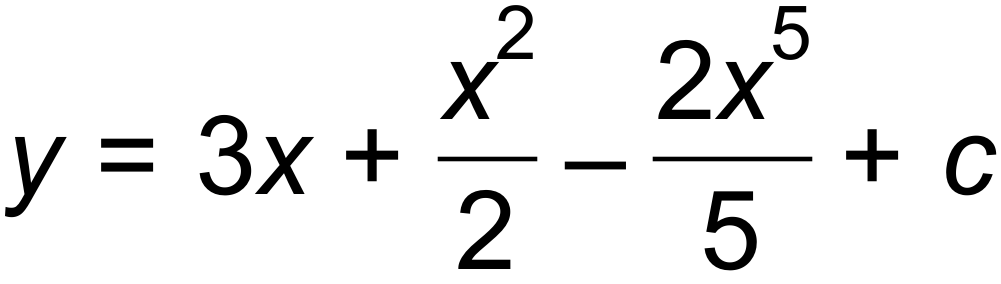
(iii) 0.7 ✓

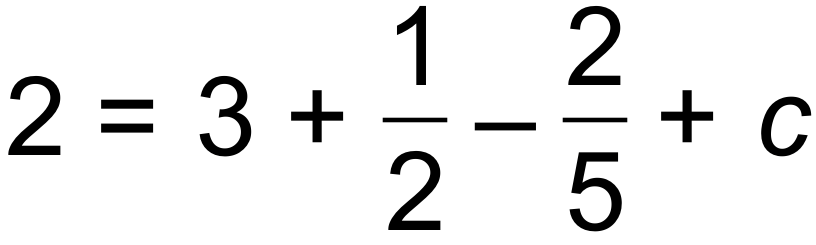
(b)  = 720 ✓✓ [5]

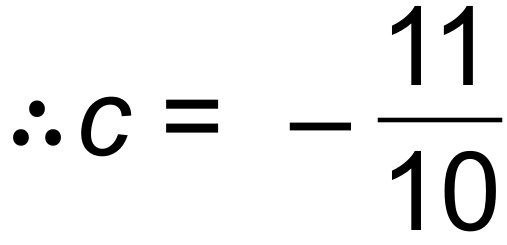
7. (a) (i)  ✓✓

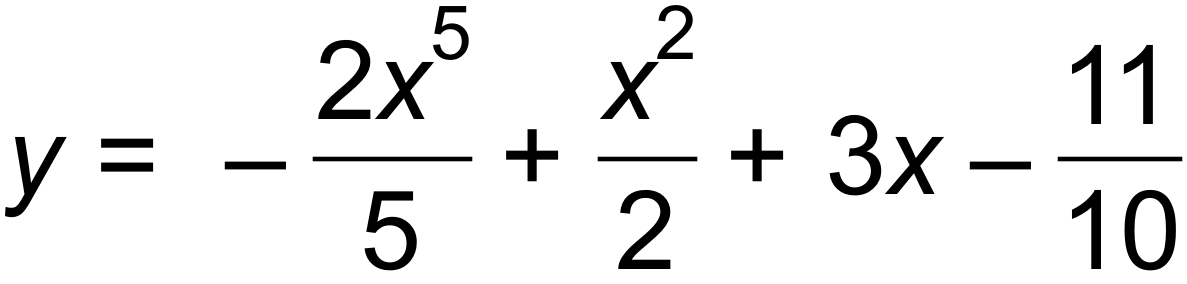
(ii)  ✓

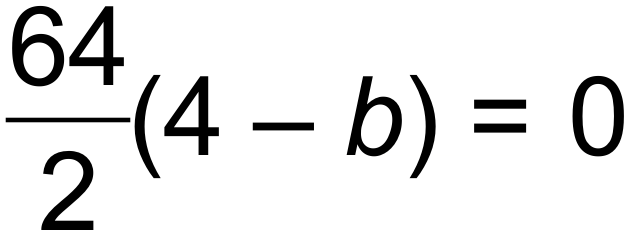
 ✓✓

(b)  ✓

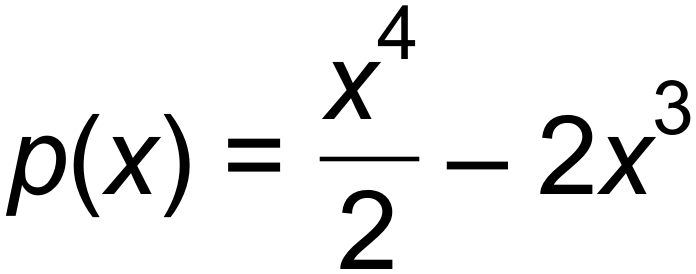


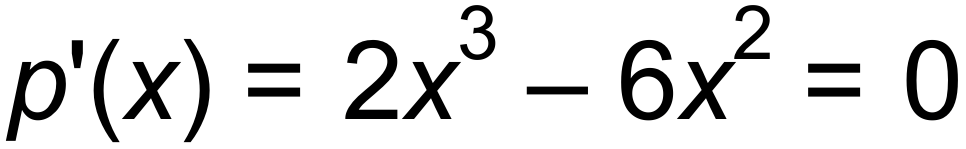
 ✓

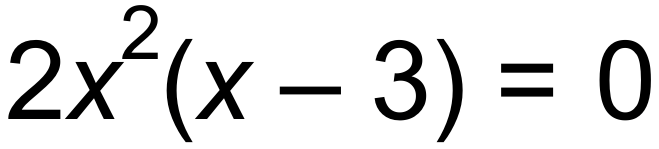
 ✓ [8]

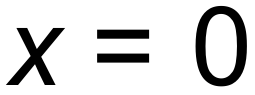
8. (a) 

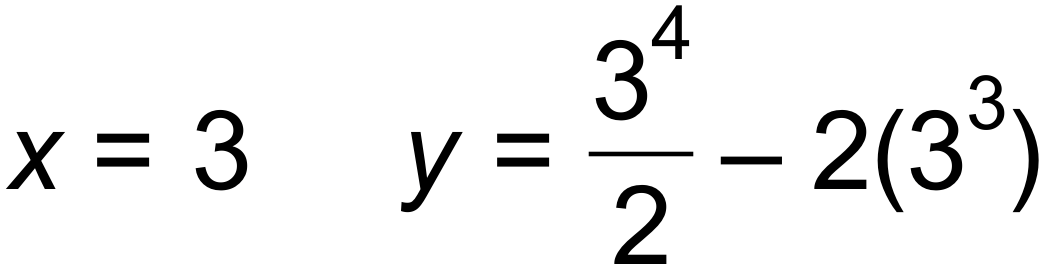
 ✓

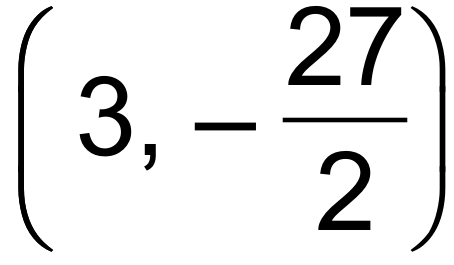
(b) 

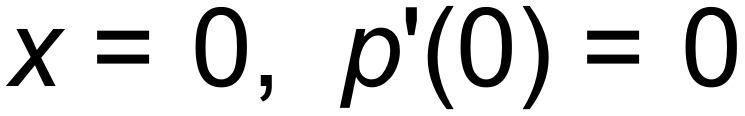
 ✓

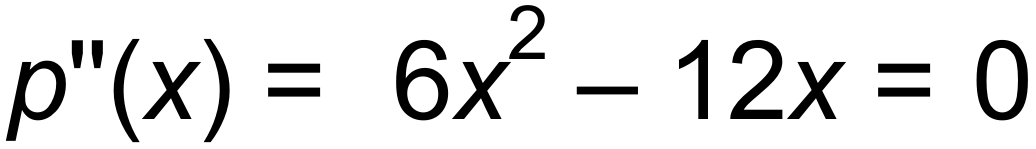


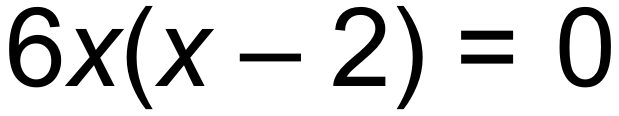
 ( is not a minimum) ✓

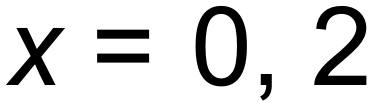
When 

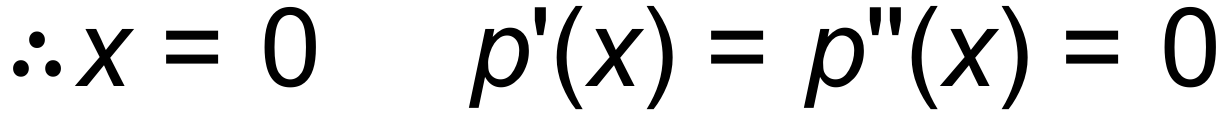
 ✓

(c) Stationary point at 

 ✓





 ✓ [6]

Horizontal point of inflection

Or sign table:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  | - | 0 | - | 0 | + |

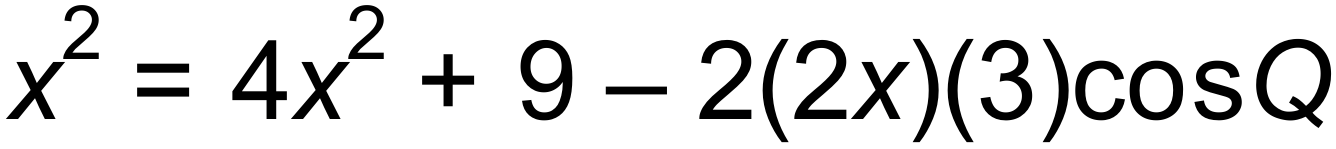
9. (a) *a1* = 3

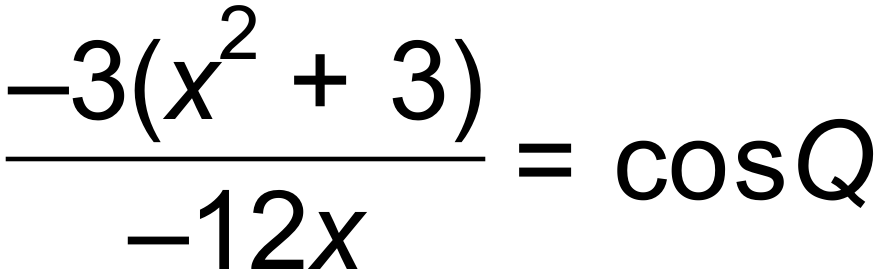
*a2* = 6

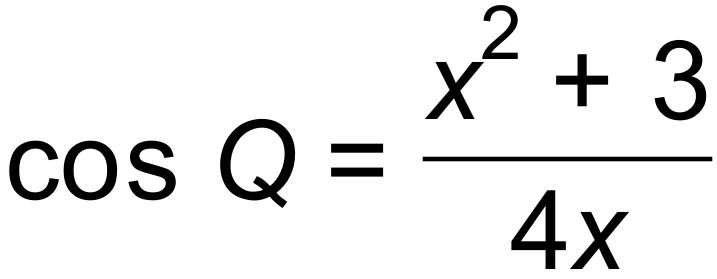
*a3 =* 10 ✓✓

(b) Tn+2 = Tn + Tn+1 T1 =1 T2 = 1 ✓ [3]

***Calculator−assumed Solutions***

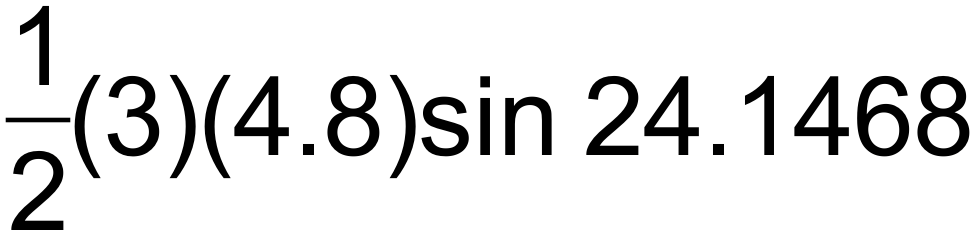
10. (a) 

 ✓

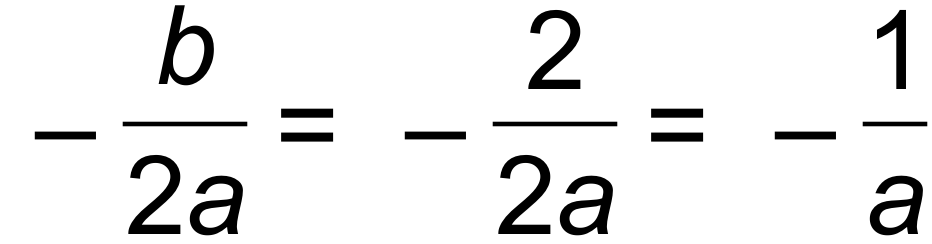
 ✓

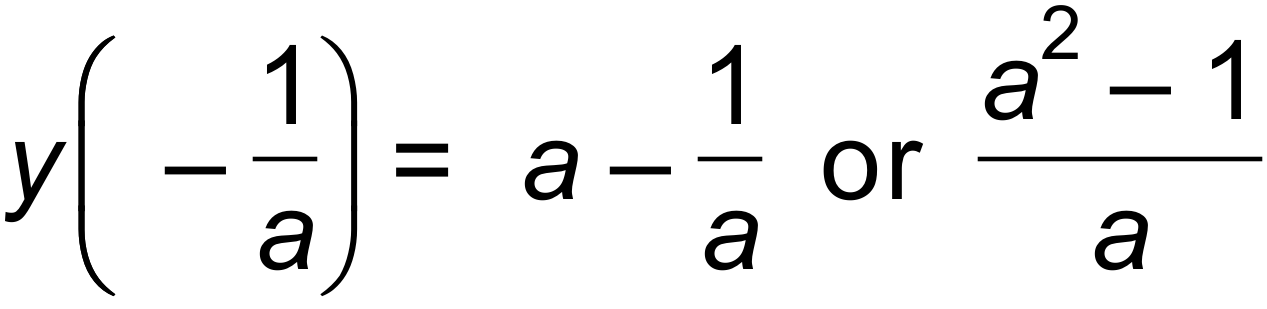
(b) cos Q = 0.9125 ✓

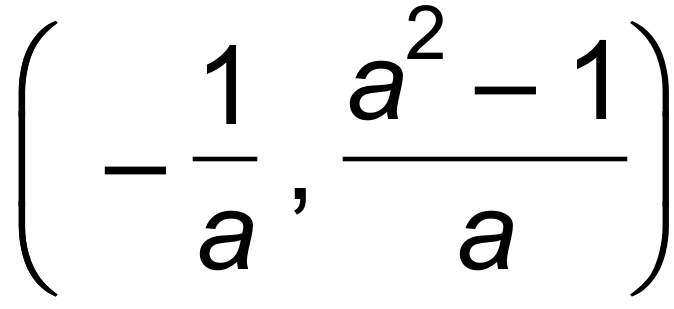
Q = 24.1468° ✓

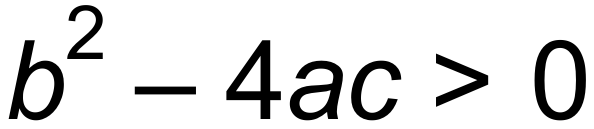
Area = 

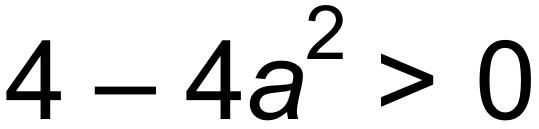
= 2.945 units2 ✓ [5]

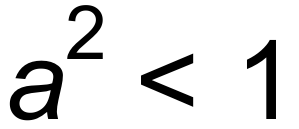
11. (a) 



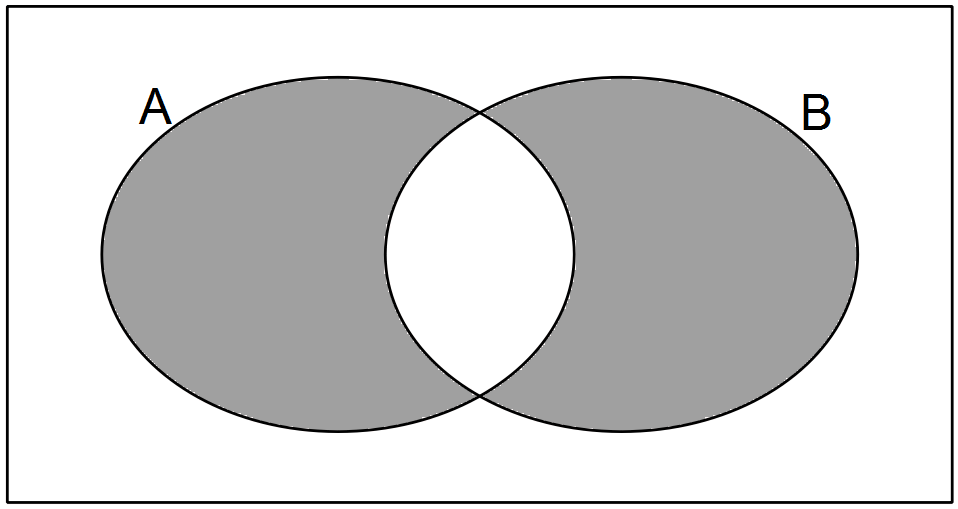
Turning point  ✓✓

(b) 

 ✓



 ✓ [4]

12. (a)

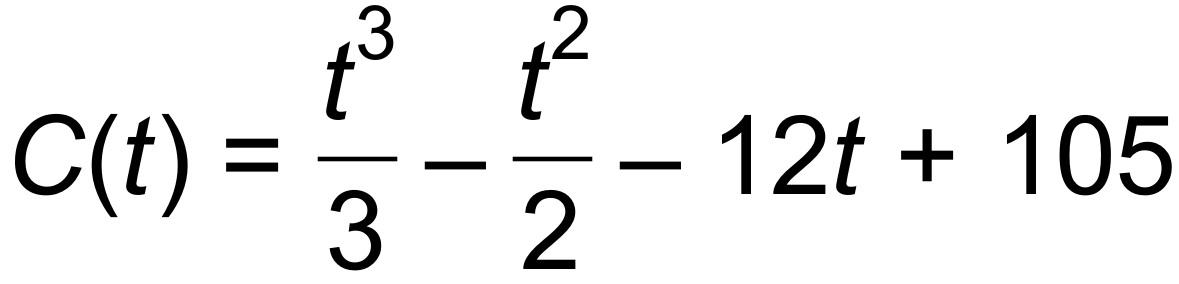
✓

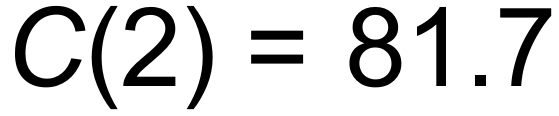
(b) (i) 0.1 ✓

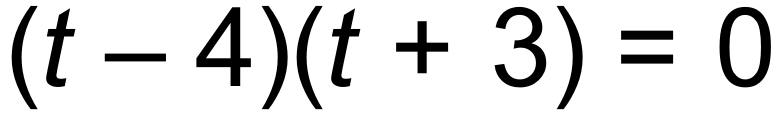
(ii) 0.2 ✓

(iii) 0.3 ✓

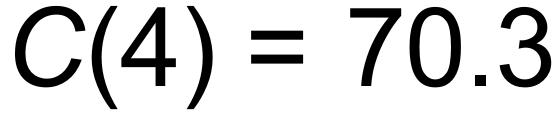
(iv) 0.9 ✓ [5]

13. (a)  ✓

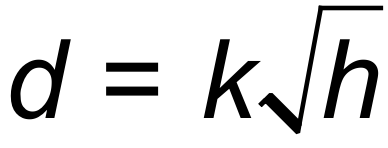
 cents ✓

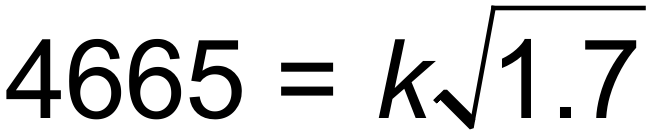
(b) 

 ✓

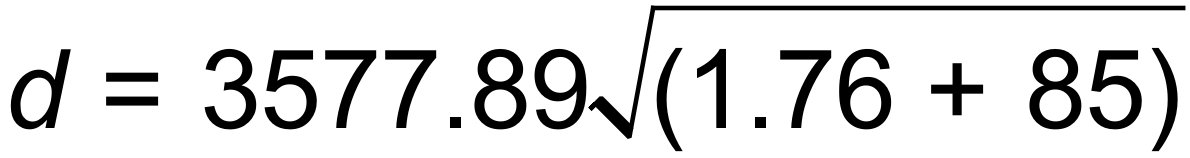
 cents ✓

(c) Week 6.8 therefore during week 7 ✓ [5]

14. (a) 



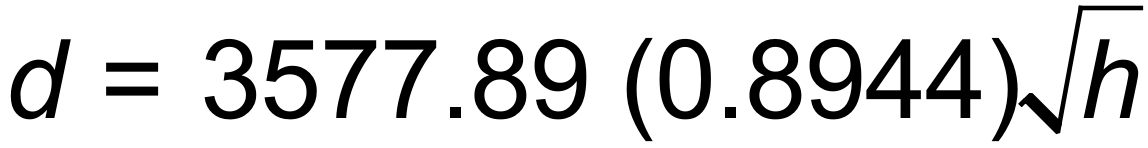
 ✓



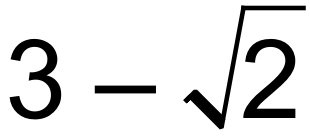
 ✓

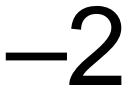
 ✓

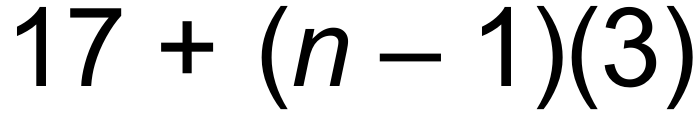
(b)  ✓



*d* decreases by 10.6%. ✓ [5]

15. (a) (i) Tn+1 = Tn +  T1 =  ✓✓

(ii) Tn+1 = 3 Tn T1 =  ✓✓

(b) Tn =  ✓

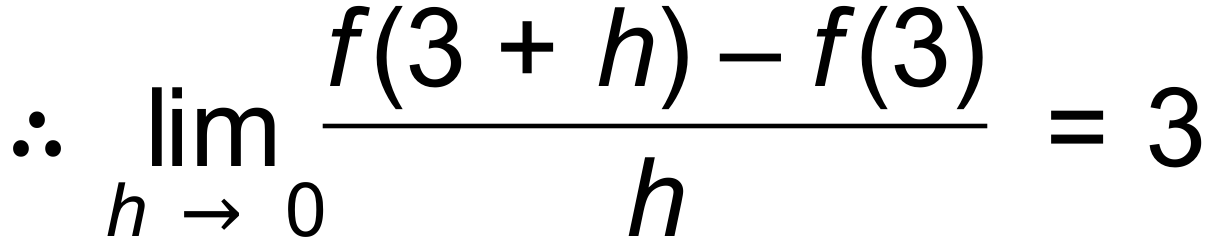
T25 = 17 + (24)(3)

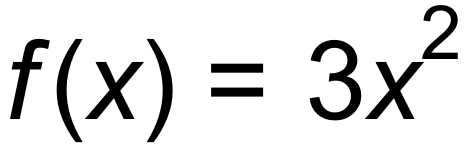
= 89 ✓ [6]

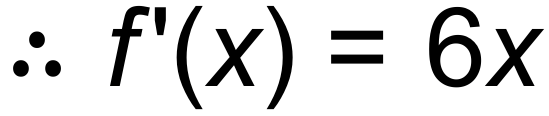
16. (a)

|  |  |
| --- | --- |
| *h →* 0 | Limit = |
| 0.1 | 3.05 |
| 0.01 | 3.005 |
| 0.0001 | 3.00005 |
| 0.000001 | 3.0000005 |

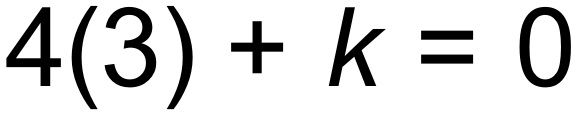
✓✓

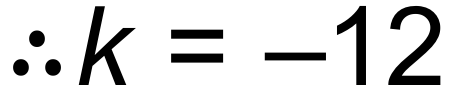
 ✓

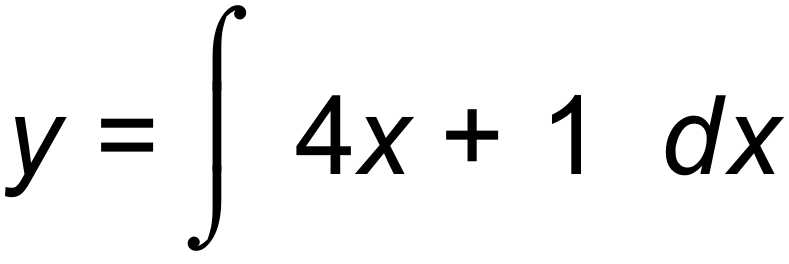
(b)  ✓

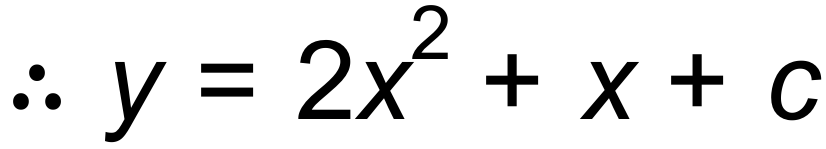
 ✓

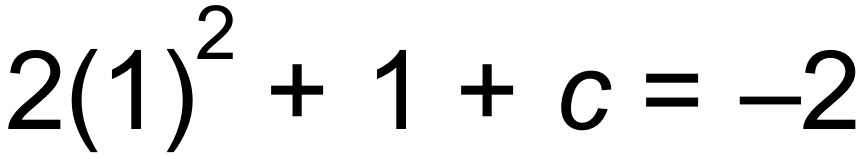
(c)  ✓

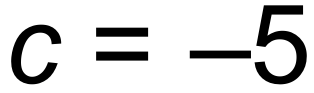


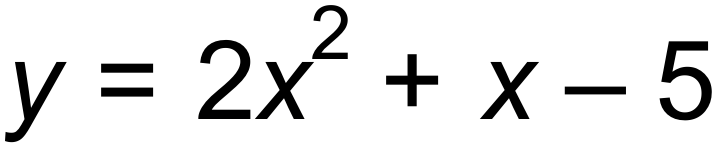
 ✓

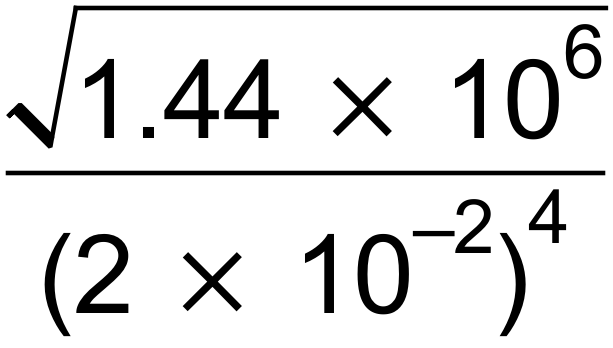
(d) 

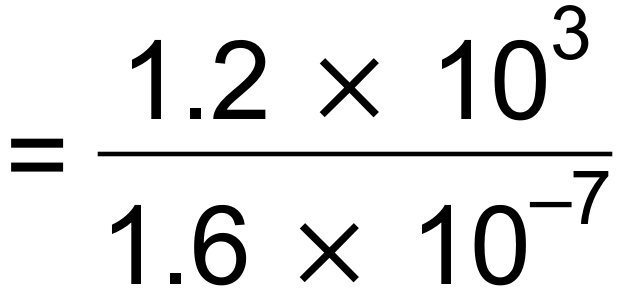
 ✓

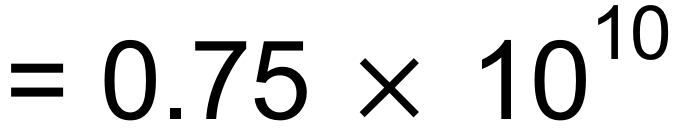




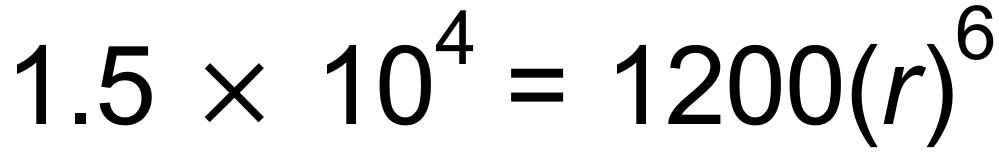
 ✓ [9]

17. (a) 

 ✓

 ✓

 ✓

(b) (i) 

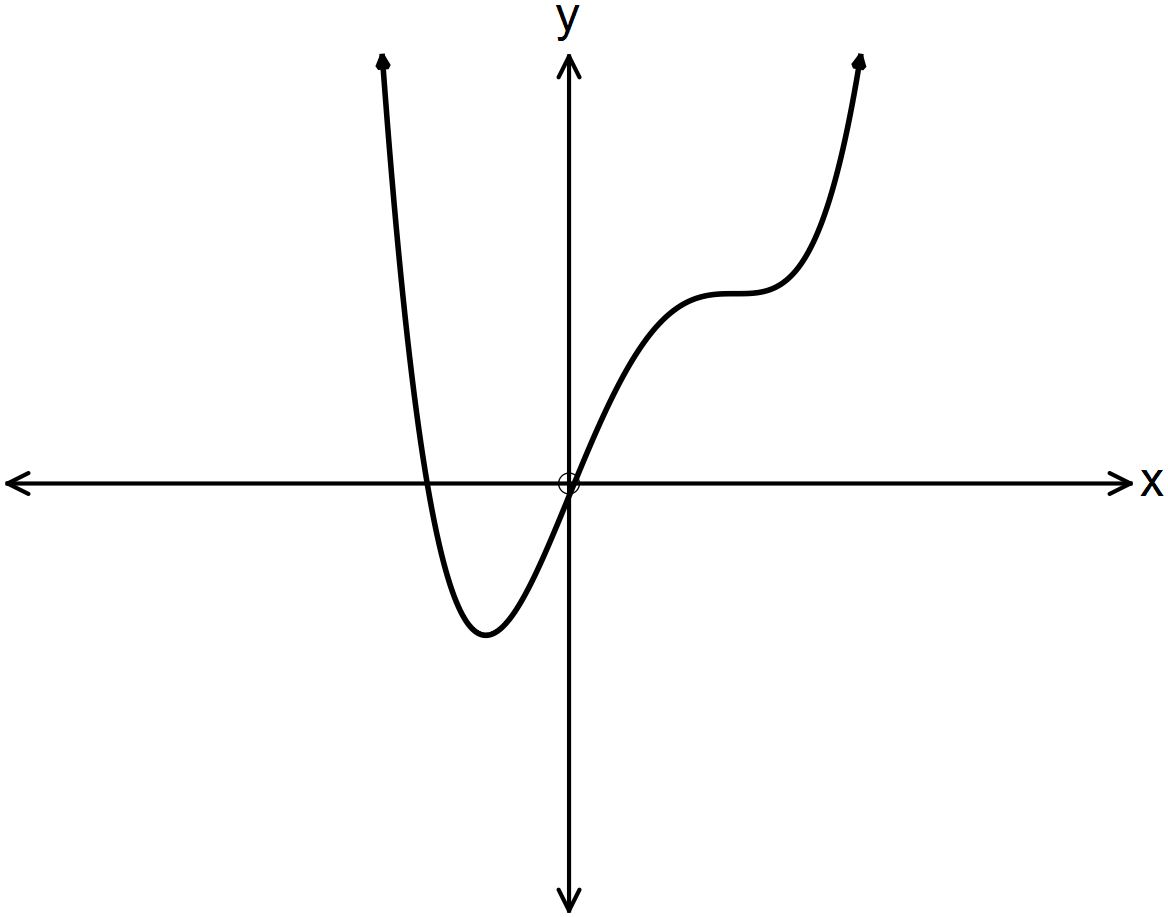
*P0* = 1200 ✓

*r =* 1.5234 ✓

(ii) *P* = 187500 ✓

(iii)  ✓

15 hours and 59 minutes. ✓ [8]

18. (a)

✓✓✓

|  |  |  |
| --- | --- | --- |
| A | B | C |
| (iii) | (ii) | (i) |

(b)

✓✓✓ [6]

19. (a) (i) n = 13

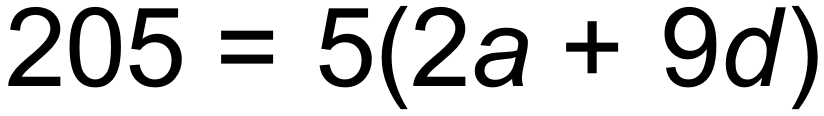
T13 = 26 + (12)(2) ✓

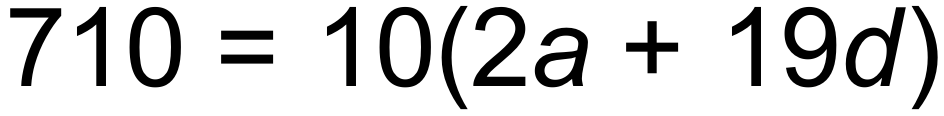
= 50 seats ✓

(ii) n = 23 Row W ✓

(iii) n = 24

Sum of seats = 1176 ✓

(b) 

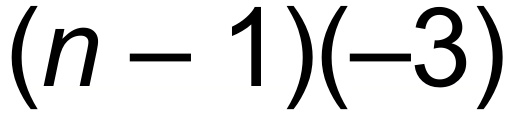
 ✓

 ✓

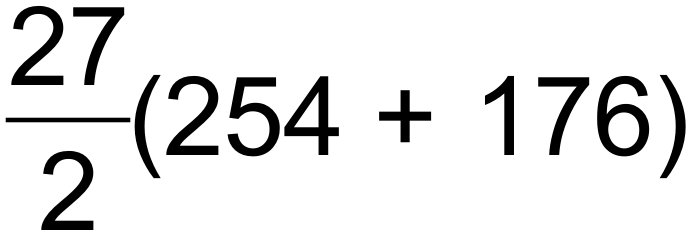
*S*30 = 

= 1515 ✓

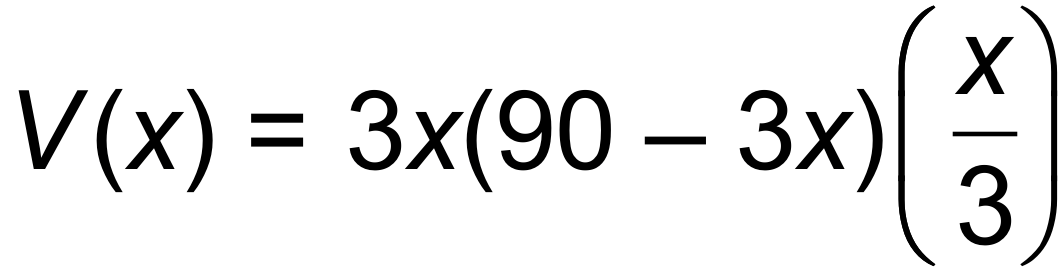
(c)  Tn = 176

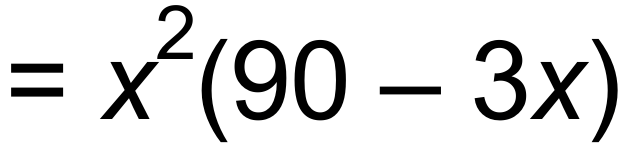
176 = 254 +  ✓

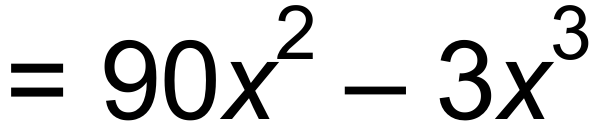
*n* = 27 ✓

*S*n  = 

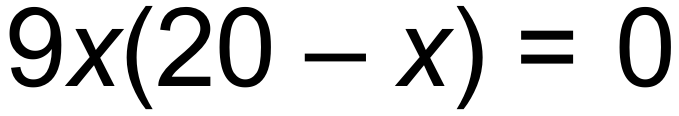
= 5805 ✓ [10]

20. (a)  ✓

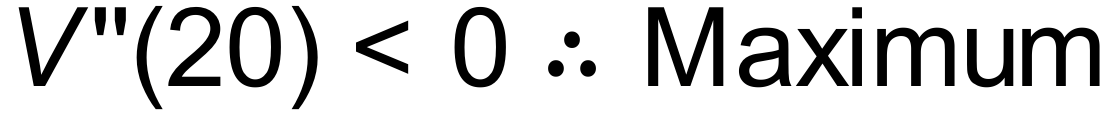
 ✓



(b) 

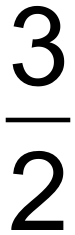
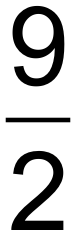
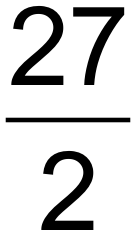
 ✓

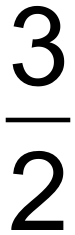
 ✓

  ✓

Maximum volume is 12000 *m*3

When length = 60 *m*, width = 30 *m*and depth= 6.67 *m* ✓ [6]

21. (a) (i) A1  =  A2  =  A3 =  ✓

(ii) An+1  = 3 An  A1  =  ✓✓

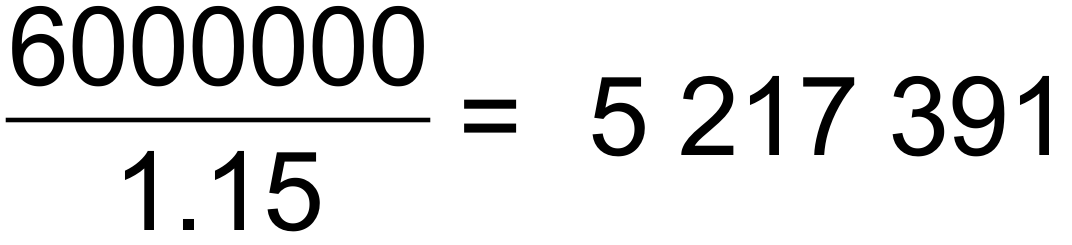
(iii) *S25*=  ✓✓

(b) (i) Tn = 2 T*n* – 1 T0 = 6

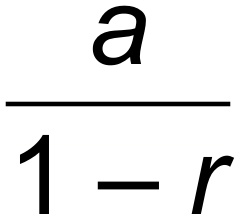
T12 = 24 576 users ✓✓

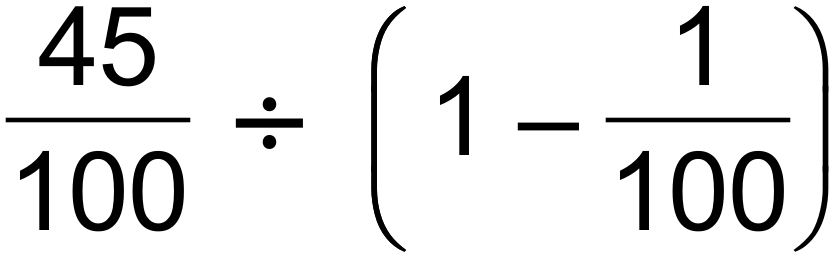
(ii) After 18 months ✓✓

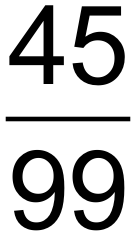
(Or during the 18th month)

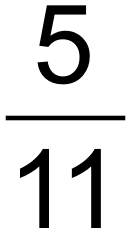
(iii)  users ✓

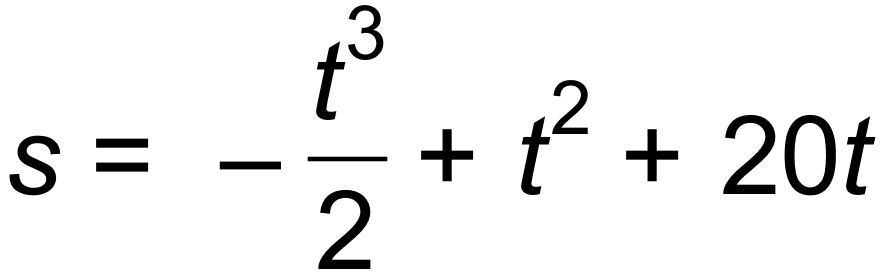
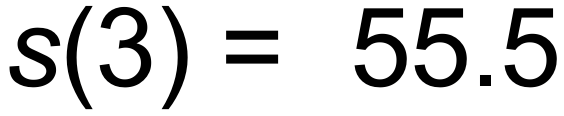
During the 20th month ✓

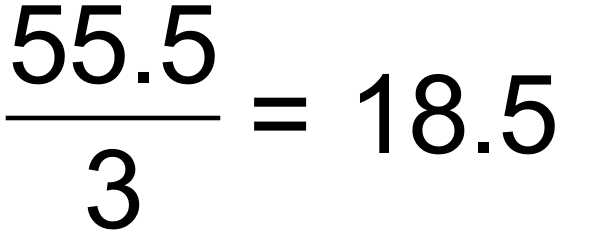
(c) *S∞* = 

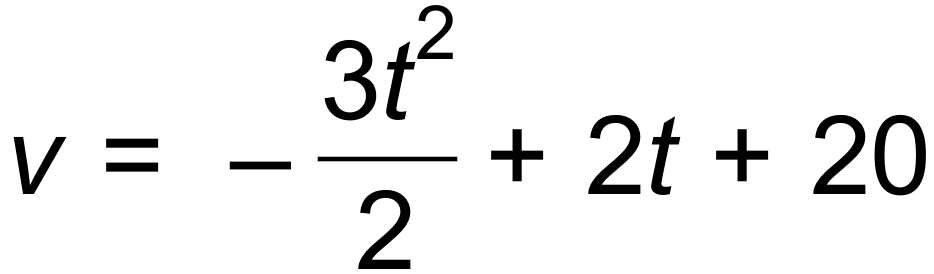
= ** ✓

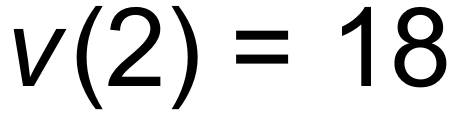
= 

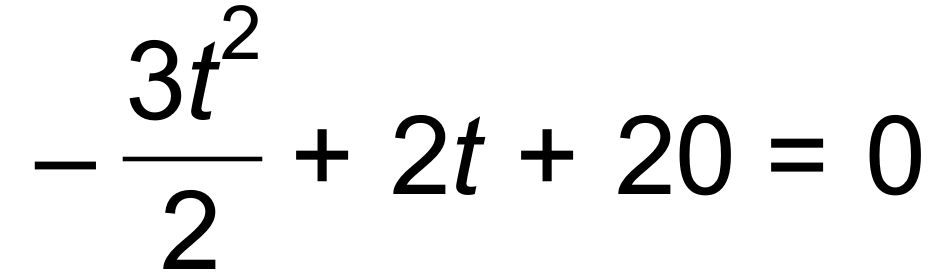
=  ✓ [13]

22. (a) . **** *m* ✓

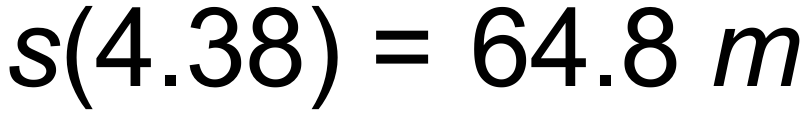
(b) *m*/*s* ✓

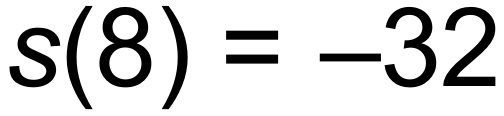
(c)  ✓

 *m*/*s* ✓

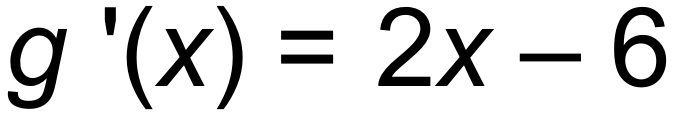
(d)  ✓

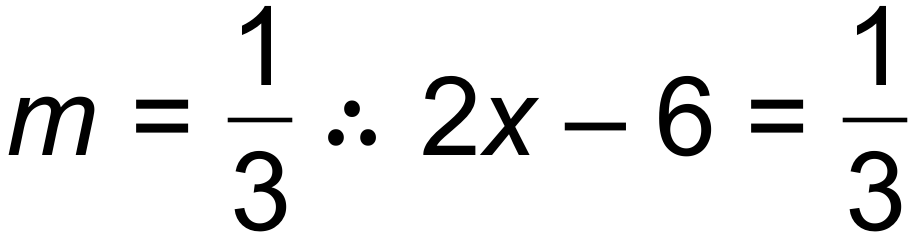
 ✓

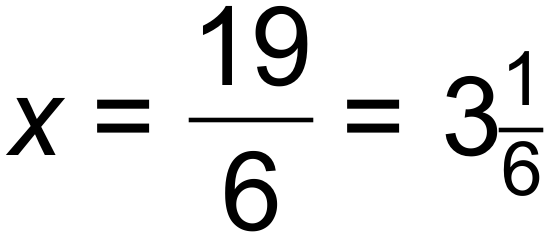
Max displacement:  ✓

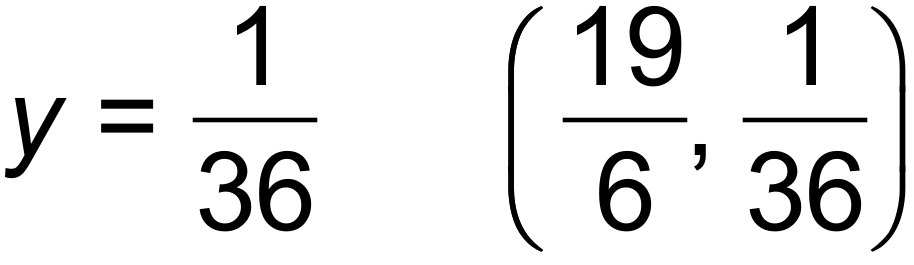
(e)  ✓

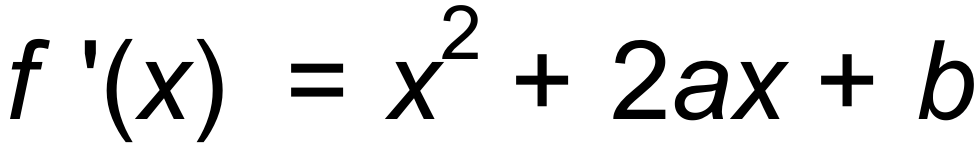
Total distance = 64.8 + 64.8 + 32 = 161.6 *m* ✓ [9]

23. (a) 

 ✓

 ✓

 ✓

(b) (i) 

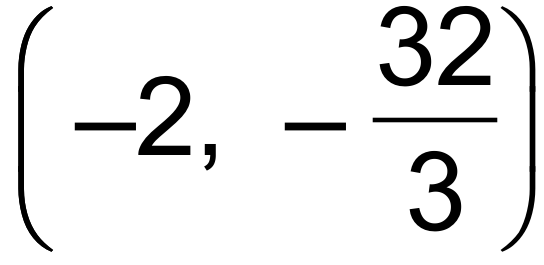
 ✓

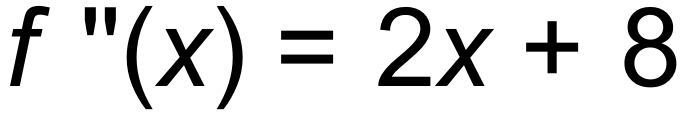
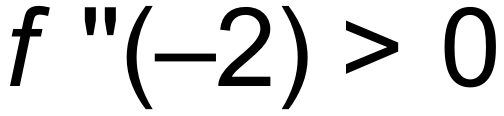
 ✓

Solving simultaneously  ✓

(ii) 

 ✓

Turning point  ✓

  Therefore Local Minimum ✓ [9]

**End of Questions**