ECO-TOURISM – Whale Watching

Number of Whales seen in Bay	Number of Days in Season
0	5
1	9
2	8
3	6
4	5
5	5
6	8
7	12
8	15
9	13
10	4

The peak Whale Watching Season in Hervey Bay is from August to October. The crew on board the *Whale Explore*r have kept records on the number of whales seen in the Bay during the main 90 day period of the previous season.

The data for the number of whales seen in the Bay and how many days they saw this number of whales is in the accompanying table.

1. This data may be modelled by functions. Let x represent the number of whales seen in the Bay. Use a Quartic regression to show that the number of days on which this number of whales was seen can be modelled by a function in the form $f(x) = a.x^4 + b.x^3 + c.x^2 + d.x + e$. Find the values of the parameters *a, b, c, d, e* for the data.

2. Show that the probability, p(x), of seeing 'x' number of whales on a randomly chosen day is modelled by the function
$$p(x) = \frac{1}{90}(5.03 + 7.55x - 4.44x^2 + 0.81x^3 - 0.0425x^4,$$ where x = {0, 1, 2, … , 10}
Then, complete a table showing the probabilities.

3. Evaluate $\sum_{x=0}^{10} p(x)$. Explain the reason for this result.

4. Calculate the mean number of whales seen in the day over the record keeping period.
Mean number = ∑ x. p(x)

5. What is the probability that 8 whales will be seen on the cruise?

6. What is the probability that no whales will be seen on the cruise?

7. What is the probability that 14 whales will be seen on the cruise?

8. What is the probability that a cruise would see at least 6 whales in the Bay?

9. What is the probability that fewer than 3 whales were seen in the Bay?

10. What is the probability that at least 4 whales where seen given that fewer than 8 whales were seen?

11. What is the probability that exactly 6 whales where seen, given that at least 5 whales were seen?

12. What is the probability that fewer than 7 whales were seen, given more than 3 whales were seen?

ECO-TOURISM – Whale Watching (solutions)

Number of Whales seen in Bay	Number of Days in Season
0	5
1	9
2	8
3	6
4	5
5	5
6	8
7	12
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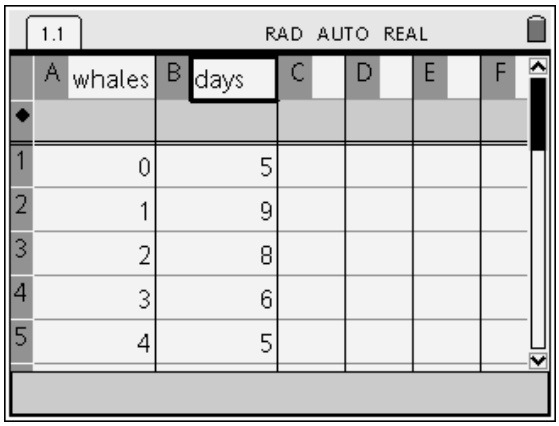
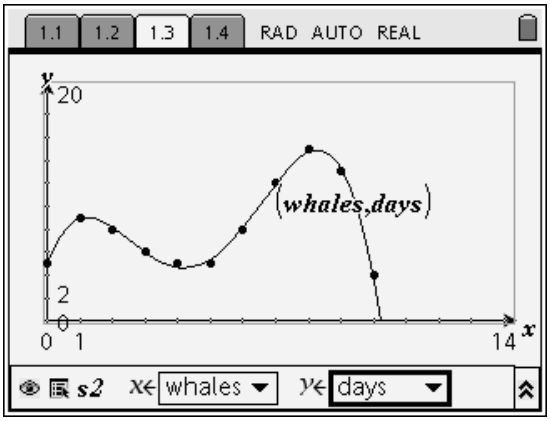
The peak Whale Watching Season in Hervey Bay is from August to October. The crew on board the *Whale Explore*r have kept records on the number of whales seen in the Bay during the main 90 day period of the previous season.

The data for the number of whales seen in the Bay and how many days they saw this number of whales is in the accompanying table.





1. This data may be modelled by functions. Let x represent the number of whales seen in the Bay. Use a Quartic regression to show that the number of days on which this number of whales was seen can be modelled by a function in the form $f(x) = a.x^4 + b.x^3 + c.x^2 + d.x + e$. Find the values of the parameters *a, b, c, d, e* for the data.

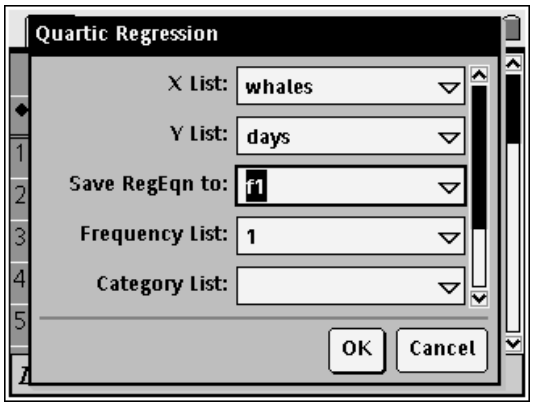


Table 1 a

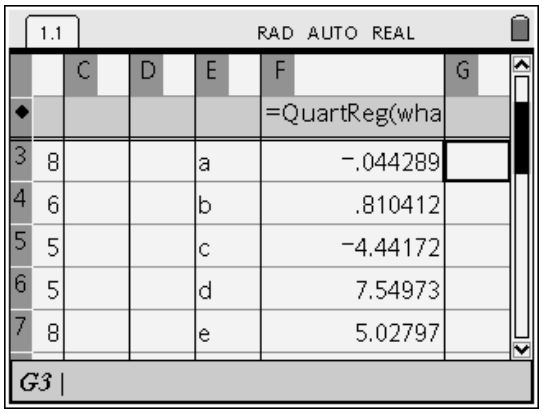


Table 1 b

2. Show that the probability, p(x), of seeing 'x' number of whales on a randomly chosen day is modelled by the function

$p(x) = \frac{1}{90}(5.03 + 7.55x - 4.44x^2 + 0.81x^3 - 0.0425x^4$, where x = {0, 1, 2, … , 10}

Then, complete a table showing the probabilities.

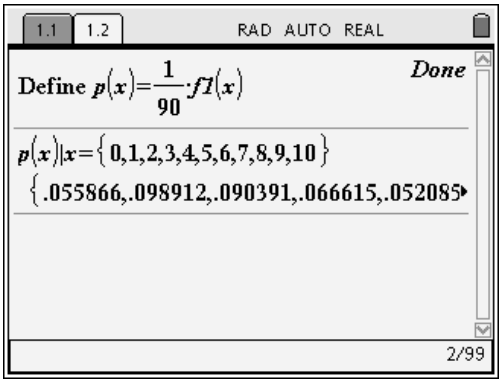


Table 2a

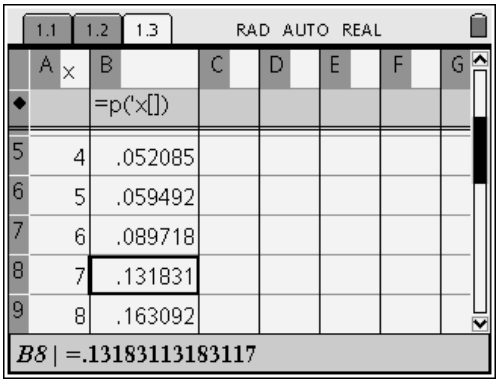


Table 2b

3. Evaluate $\sum_{x=0}^{10} p(x)$ (Each of these operations may be done using the non-CAS "sum" command). Explain the reason for this result.

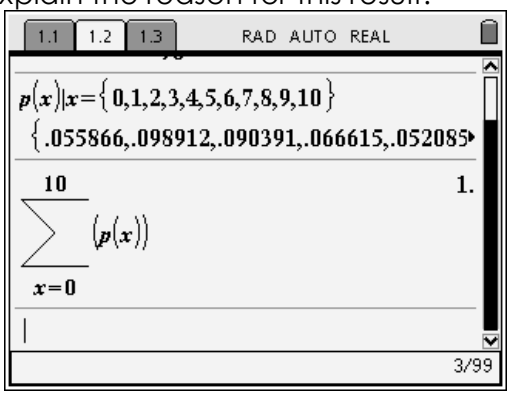


Table 3

4. Calculate the mean number of whales seen in the day over the record keeping period.

Mean number = ∑ x. p(x)

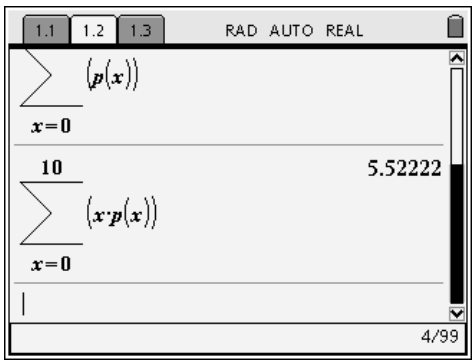


Table 4

5. What is the probability that 8 whales will be seen on the cruise?

6. What is the probability that no whales will be seen on the cruise?

7. What is the probability that 14 whales will be seen on the cruise?

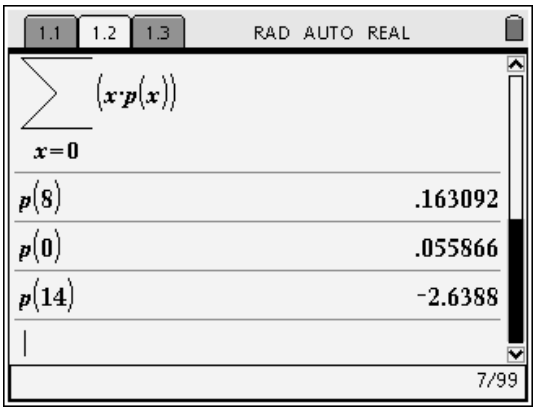


Table 5 -7

8. What is the probability that a cruise would see at least 6 whales in the Bay?

9. What is the probability that fewer than 3 whales where seen in the Bay?

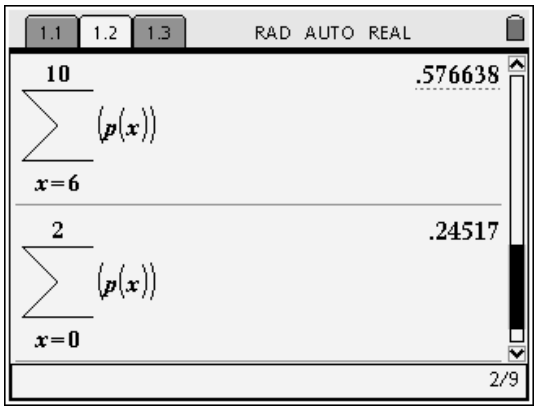


Table 8-9

10. What is the probability that at least 4 whales where seen given that fewer than 8 whales were seen?

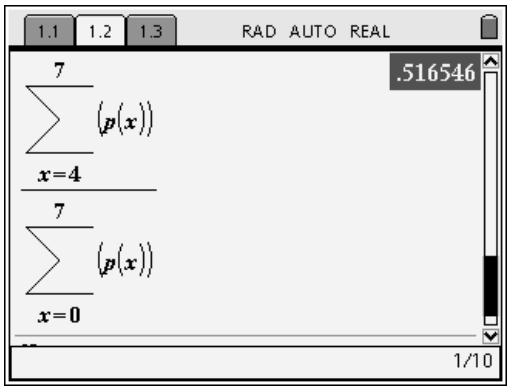


Table 10

11. What is the probability that exactly 6 whales where seen, given that at least 5 whales were seen?

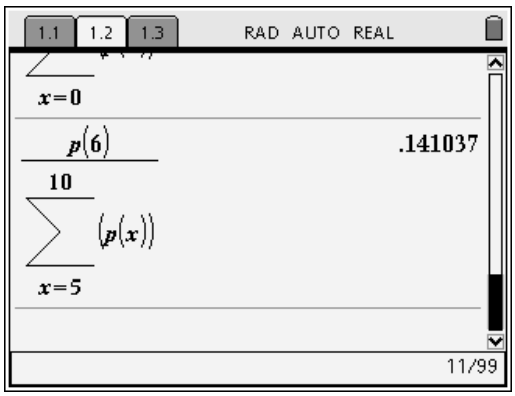


Table 11

12. What is the probability that fewer than 7 whales were seen, given more than 3 whales were seen?

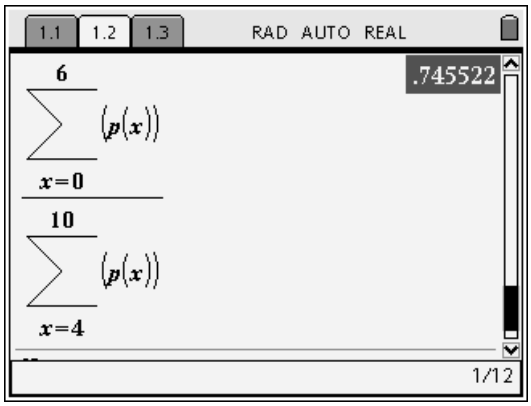


Table 12