BECA / IB Math 01-Linear functions
21 January 2022

Name: Solutions

Exam: Linear functions and arithmetic sequences

Simple interest: $I = Crt$

1. The rate on a credit card is 15% per annum. Find the interest due on a \$900 purchase after one month.

$I = 900 \times 0.15 \times \frac{1}{12}$

$= 11.25$ dollars

2. Elizabeth takes out a 6 month loan to purchase and repair a used car for resale. The principal amount is 11,000 British pounds and interest rate is 6.45% per annum. Find the interest Elizabeth pays.

$I = 11{,}000 \times 0.0645 \times \frac{6}{12}$

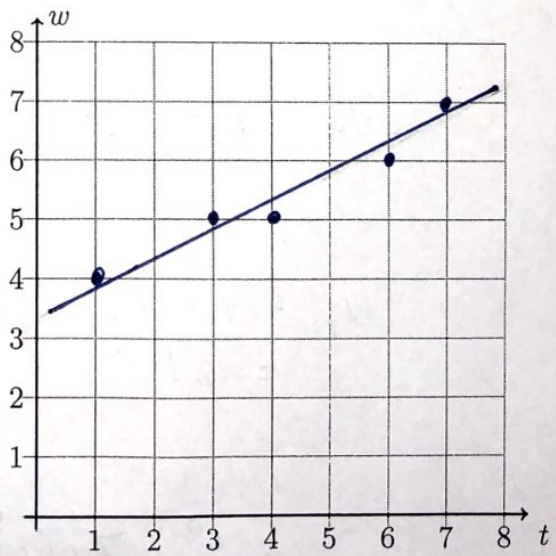
$= 354.75$ pounds

3. The weight of a turkey w in kilograms over a period of time t measured in months is shown in the table.

   (a) Plot the data as points on the grid.

   (b) Draw a line of best fit on the graph. Use a straight edge for full credit.

t	w
1	4
3	5
4	5
6	6
7	7



Arithmetic sequences

Terms: $u_n = u_1 + d(n-1)$

Sum: $S_n = \frac{n}{2}(u_1 + u_n)$

4. Given the arithmetic sequence $3, 7, 11, 15, 19, \ldots$ [6]

   (a) Find the common difference d.

   $d = 7 - 3 = 4$

   (b) Write down the next term, u_6.

   $u_6 = 19 + 4 = 23$

   (c) Find the twelfth term.

   $u_{12} = 3 + 4(12-1)$
   $= 47$

   (d) Find the sum of the first twelve terms.

   $S_{12} = \frac{12}{2}(3+47)$
   $= 300$

5. In an arithmetic sequence the first term is 7 and the fourth term is 25. [6]

   (a) Find the common difference d.

   $u_4 = 7 + d(4-1) = 25$
   $d = 6$

   (b) Find the tenth term, u_{10}.

   $u_{10} = 7 + 6(10-1)$
   $= 61$

   (c) Find the sum of the first ten terms.

   $S_{10} = \frac{10}{2}(7+61)$
   $= 340$

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6. The second term of an arithmetic sequence is 19 and the sixth term is 7. [6]

(a) Find the common difference d.

$u_6 = u_1 + d(6-1) = 7$
$u_2 = u_1 + d(2-1) = 19$ (subtract equations)
$4d = -12$
$d = -3$

(b) Find the first term, u_1.

$u_1 = 19 - (-3) = 22$

(c) Find the sum of the first six terms.

$S_6 = \frac{6}{2}(22+7)$
$= 87$

7. Given $f(x) = \frac{3}{5}x - 3$. [3]

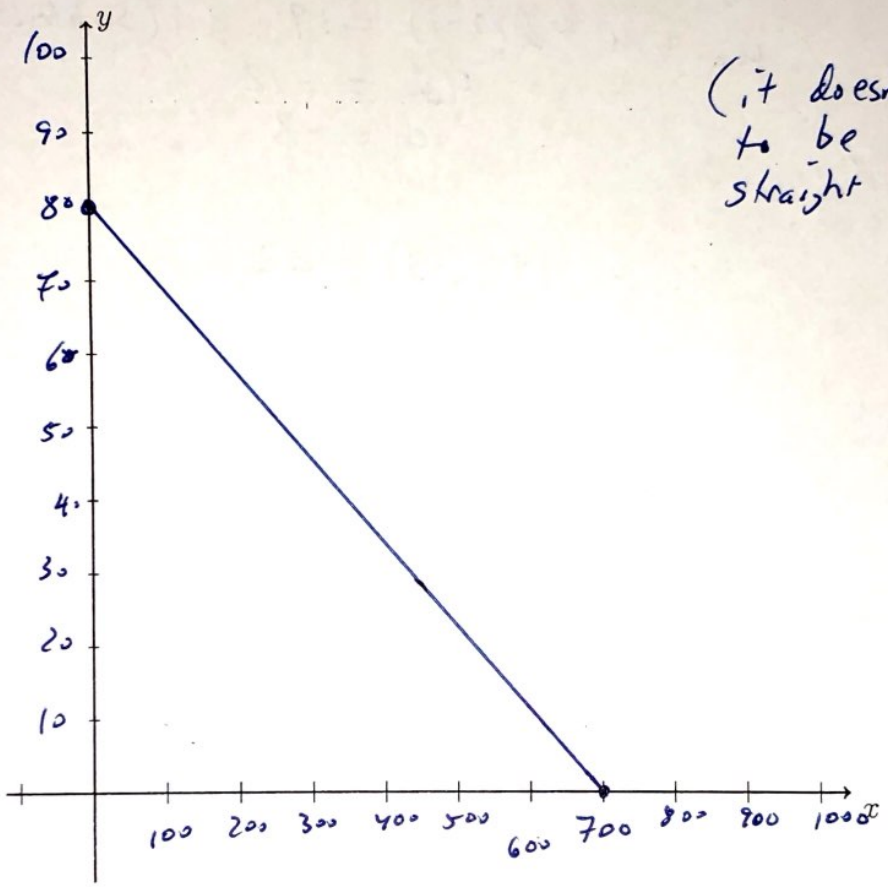
(a) Find $f(10)$. $= \frac{3}{5}(10) - 3$
$= 3$

(b) Find $f^{-1}(0)$.

$f(x) = \frac{3}{5}x - 3 = 0$
$x = 5$

check: $f(5) = \frac{3}{5}(5) - 3 = 0$ ✓

8. A function is defined over the domain $0 \leq x \leq 700$. Its intercepts are $(700, 0)$ and $(0, 80)$. Draw the function on the grid. Label and number the x- and y-axes with an appropriate scale. [3]



(it doesn't have to be a straight line)