Name: SOLUTIONS

5.0 Calculator practice: Linear regression, systems of equations, cosine rule, frequency table statistics

1. Apply the law of cosines, $c^2 = a^2 + b^2 - 2ab\cos\theta$.

   (a) $a = 22.5$, $b = 15.7$, $\theta = 110°$. Find the third side length, c. [3]

   (b) $a = 8.4$, $b = 7.2$, $c = 13.0$. Find the angle measure, θ. [3]

Working:

a) $c^2 = 873.55\ldots$

$c = 29.5560\ldots$

b) $\cos\theta = \dfrac{13^2 - 8.4^2 - 7.2^2}{(8.4)(7.2)}$

$\cos\theta = 0.77050\ldots$

$\theta = 39.6009\ldots$

Answers:

(a) 29.6

(b) 39.6°

2. Perform a linear regression on the data in the table, finding $y = ax + b$.

x	14	15	13	16	19	11	13
y	51.1	58.7	49.2	63.2	71.5	45.7	48.4

   (a) Write down the value of a, b, and r. [3]

   (b) Characterize the correlation coefficient. [1]

   (c) Use your regression line to estimate y for $x = 19$. [2]

Working:

(a) $a = 3.56798\ldots$

$b = 3.91906\ldots$

$r = 0.975810\ldots$

$y = 3.57x + 3.92$

$= 71.71079\ldots$

Answers:

(a) $a = 3.57$, $b = 3.92$, $r = 0.976$

(b) strong, positive

(c) 71.7

3. Find the solutions for the system, the value(s) for x such that $f(x) = g(x)$. Sketch the graph to show working.

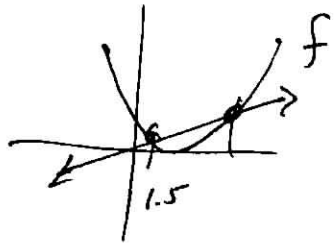
   (a) $f(x) = x^2 - 6x + 10$

   $y = \frac{3}{2}x + 1$ [3]

Working:

$x = 1.5$
$y = 3.25$

$x = 6$
$y = 10$



Answers:

(a) 1.5, 6

4. The data for $n = 40$ are shown in the frequency table below.

Mark (x)	$10 \leq x < 30$	$30 \leq x < 50$	$50 \leq x < 70$	$70 \leq x < 90$
Frequency	7	13	17	k

(a) Find the value of k. [1]

(b) Estimate the mean $\overline{x}$. [2]

(c) Estimate the standard deviation of the data, σ. [2]

Working:

$7 + 13 + 17 + k = 40$
$k = 3$

$\overline{x} = 48$

$\sigma = 17.2046...$

Answers:

(a) 3

(b) 48

(c) ~~17.2~~ 17.2