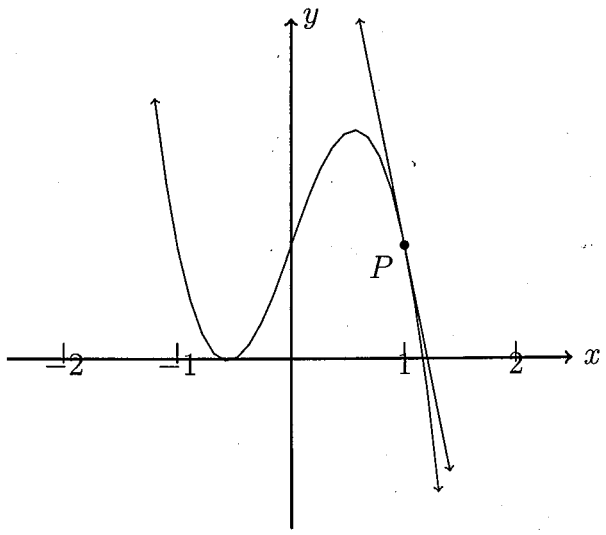
Name: SOLUTIONS

6.7 Do Now Quiz: Tangents, systems of equations, frequency tables
Calculator practice E

1. A cubic function $f(x) = -2x^3 - x^2 + 3x + 1$ is shown on the axes below.



A tangent to the function at $x = 1$ is drawn with the point of tangency P.

(a) Find the coordinates of P. [1]

(b) Write down the derivative of the function, $f'(x)$. [2]

(c) Show that the gradient of the tangent line is -5. [1]

(d) Write down the equation of the tangent line. [2]

(e) Find the coordinates of the two extrema of f. [2]

Working:

a) $f(1) = -2(1^3) - (1^2) + 3(1) + 1$
$= 1$

c) $f'(1) = -6(1^2) - 2(1) + 3$
$= -5$

e) min: $(-0.89315\ldots, -1.05220\ldots)$

max: $(0.559816\ldots, 2.015168\ldots)$

Answers:

(a) $(1, 1)$

(b) $f'(x) = -6x^2 - 2x + 3$

(c) ~~(c)~~

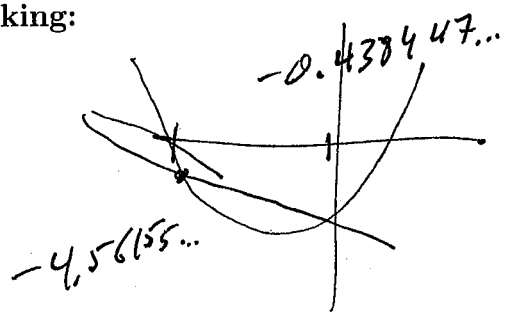
(d) $y - 1 = -5(x - 1)$

(e) $(-0.893, -1.05)$, $(0.560, 2.02)$

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

$f(x) = \frac{1}{2}x^2 + 2x - 3$ $\quad$ $g(x) = -\frac{1}{2}x - 4$ [3]

Working:



Answers:

(a) -4.56, -0.438

3. The SAT Math scores of a representative 100 North Carolina students are shown below.

Score	$400 \leq x < 450$	$450 \leq x < 500$	$500 \leq x < 550$	$550 \leq x < 600$
Freq	k	21	43	22

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

(b) Write down the modal class. [1]

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

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

Working:

a) $k + 21 + 43 + 22 = 100$
$k = 14$

c) $\overline{x}$

d) $\sigma =$

Answers:

(a) 14

(b) $500 \leq x < 500$

(c)

(d)