Topical Revision Paper 3

Term 1 Unit 3: Equations and Inequalities

Question 1:

(a) Solve the equation $\left| x^2 - 3 \right| = 2x$. [4]

(b) Find the range of values of x for which $x^2 + x < 6$.

Hence, find the range of values of x that satisfy $(2x-3)\left(x^2 + x - 6\right) > 0$. [6]

Answer:

(a) $x = 3$ or $x = 1$ (b) $-3 < x < 2$; $-3 < x < \frac{3}{2}$ or $x > 2$

Question 2:

Find the possible values of k for which the line $y = kx - 1$ is a tangent to the curve $y = x^2 + 3$.

Hence ,state the range of values of k for which the line will **not** meet the curve. [6]

Answer : $-4 < k < 4$

Question 3:

Solve the equation $2^{2x+1} = 7(2^{x+1}) + 36$, leaving your answers in two decimal places. [4]

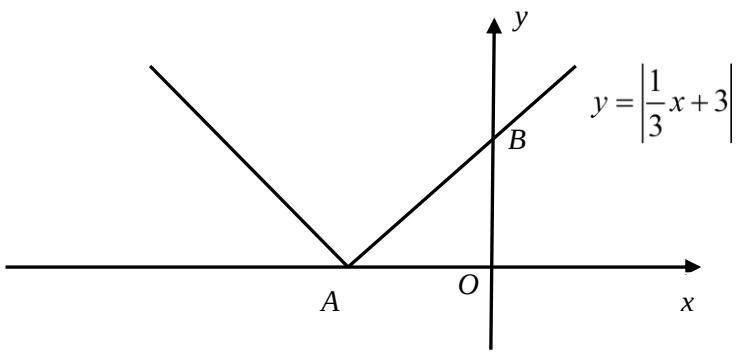
Answer : $y = 3.17$

Question 4:

Find the range of values of k for which the graph of $y = x^2 + 3kx + \left(2k^2 + \frac{1}{2}k + 2 \right)$ intersects the x -axis at two distinct points. [3]

Answer : $\therefore k > 4$ or $k < -2$

Question 5:



The diagram above shows part of the graph of $y = \left|\frac{1}{3}x + 3\right|$ with A and B as the x and y intercepts respectively.

(i) State the coordinates of A and B. [2]

(ii) For each of the cases below, determine the number of intersections of the line $y = mx + c$ with $y = \left|\frac{1}{3}x + 3\right|$, justifying your answer.

(a) $m = \frac{1}{3}$ and $c = 0$, [2]

(b) $m = \frac{1}{4}$ and $c = 3$. [2]

Answer:

(i) $A(-9, 0)$ and $B(0, 3)$

(ii) $y = mx + c$ is parallel and below $y = \left|\frac{1}{3}x + 3\right|$ for all x. Hence will not intersect at any point or zero intersection

$y = mx + c$ will intersect $y = \left|\frac{1}{3}x + 3\right|$ at (0,3) and also intersect $y = \left|\frac{1}{3}x + 3\right|$ for $x < -9$

(iii) Hence, two intersections