AQA – Algebra functions – A2 Mathematics P2

1. June/2020/Paper_2/No.1

Which one of these functions is decreasing for all real values of x?

Circle your answer.

[1 mark]

$f(x) = e^{x}$ $f(x) = -e^{1-x}$ $f(x) = -e^{x-1}$ $f(x) = -e^{-x}$

2. June/2020/Paper_2/No.2

Which one of the following equations has no real solutions?

Tick (✓) **one** box.

[1 mark]

$\cot x = 0$ ☐

$\ln x = 0$ ☐

$|x + 1| = 0$ ☐

$\sec x = 0$ ☐

3. June/2020/Paper_2/No.7

a and b are two positive irrational numbers.

The sum of a and b is rational.

The product of a and b is rational.

Caroline is trying to prove $\frac{1}{a}+\frac{1}{b}$ is rational.

Here is her proof:

Step 1	$\frac{1}{a}+\frac{1}{b}=\frac{2}{a+b}$
Step 2	2 is rational and $a+b$ is non-zero and rational.
Step 3	Therefore $\frac{2}{a+b}$ is rational.
Step 4	Hence $\frac{1}{a}+\frac{1}{b}$ is rational.

(a) (i) Identify Caroline's mistake.

[1 mark]

(a) (ii) Write down a correct version of the proof.

[2 marks]

(b) Prove by contradiction that the difference of any rational number and any irrational number is irrational.

[4 marks]

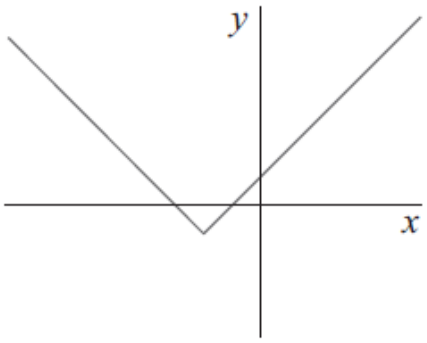
4. June/2019/Paper_2/No.1

Identify the graph of $y = 1 - |x + 2|$ from the options below.

Tick (✓) **one** box.

[1 mark]

A



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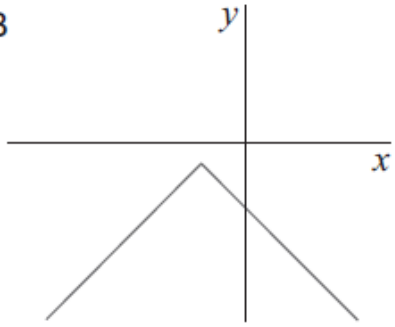
B



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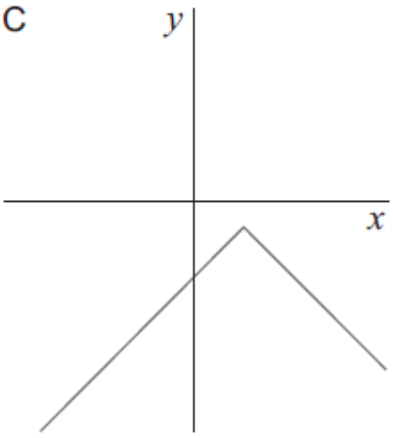
C



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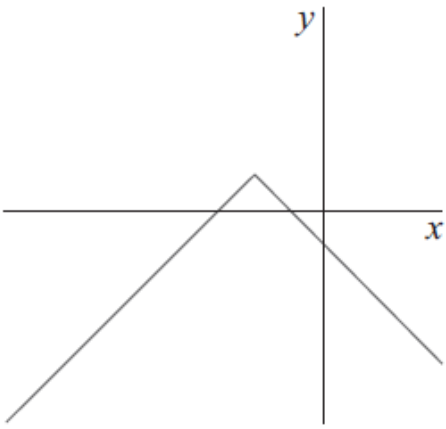
D



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5. June/2019/Paper_2/No.2

Simplify $\sqrt{a^{\frac{2}{3}} \times a^{\frac{2}{5}}}$

Circle your answer.

[1 mark]

$a^{\frac{2}{15}}$ $a^{\frac{4}{15}}$ $a^{\frac{8}{15}}$ $a^{\frac{16}{15}}$

6. June/2019/Paper_2/No.3

Each of these functions has domain $x \in \mathbb{R}$

Which function does **not** have an inverse?

Circle your answer.

[1 mark]

$f(x) = x^3$ $f(x) = 2x + 1$ $f(x) = x^2$ $f(x) = e^x$

7. June/2019/Paper_2/No.4

$x^2 + bx + c$ and $x^2 + dx + e$ have a common factor $(x + 2)$

Show that $2(d - b) = e - c$

Fully justify your answer.

[4 marks]