TMUA Practice - Graphs of Functions

1. Given that $f(x) = x^2 - 5x + 7$

Find the sum of the x- and y- coordinates of the minimum point of $y = f(x - 2)$

A $\frac{21}{4}$ B $\frac{13}{4}$ C $\frac{5}{4}$ D $\frac{1}{4}$ E $-\frac{7}{4}$

2. The curve with equation $x^9 + x^7 + y^4 + y^8 = 2$ has

A neither the x-axis nor y-axis as a line of symmetry
B the x-axis but not the y-axis as a line of symmetry
C the y-axis but not the x-axis as a line of symmetry
D both axes as lines of symmetry

3. How many solutions does the following equation have (where x is given in degrees)?

$$sin^2x = x^2 - 180x + 8099$$

A 0
B 1
C 2
D 4
E 8
F infinitely many

4. How many regions are there (excluding the coordinate axes) when the following curves are drawn?

$$y = x^2 \qquad y = x^2 - 3x \qquad y = x^2 + 3x + 6$$

A 4

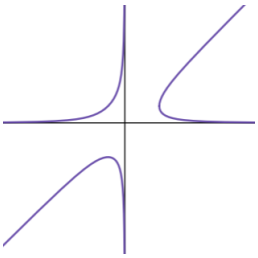
B 5

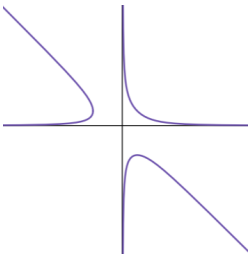
C 6

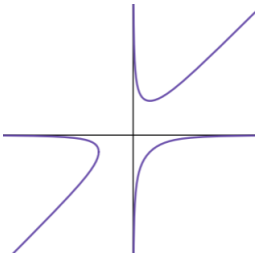
D 7

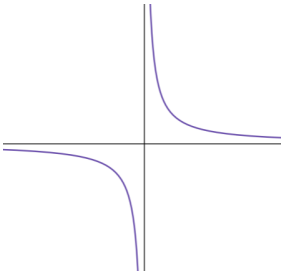
E 8

5. A sketch of the curve with equation $xy(x - y) = 1$ is drawn in:

A 

B 

C 

D 

6. How many solutions does the following equation have

$$cos^2 x = x^3$$

A 0

B 1

C 2

D 4

E 8

F infinitely many

7. The graph of $y = 2^{x^2}$ has a series of transformations applied, resulting in the graph of $y = 2^{x^2+2x+4}$

Which of the following could be the sequence of transformations?

A a translation parallel to the *x*-axis, followed by a stretch parallel to the *y*-axis

B a translation parallel to the *x*-axis, followed by a translation parallel to the *y*-axis

C a translation parallel to the *y*-axis, followed by a stretch parallel to the *y*-axis

D a stretch parallel to the *x*-axis, followed by a translation parallel to the *x*-axis

E a stretch parallel to the *x*-axis, followed by a translation parallel to the *y*-axis

F a stretch parallel to the *x*-axis, followed by a stretch parallel to the *y*-axis

8. The graph of $y = f(x)$ interests the *x*-axis at exactly two distinct points.

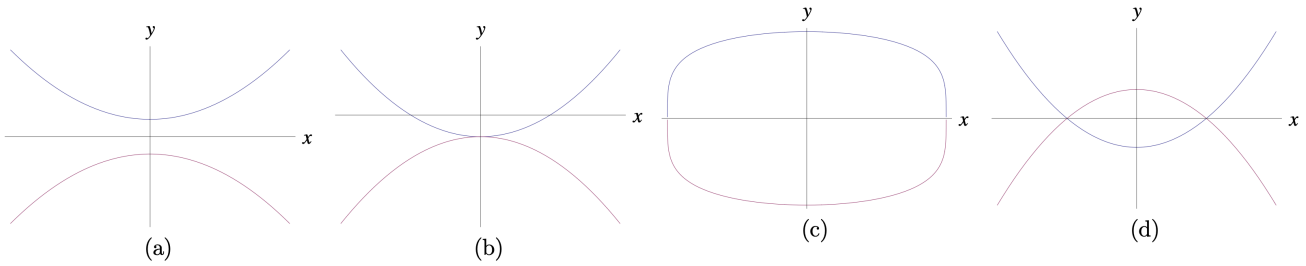
Consider the following five graphs:

$y = f(x) - 3$ $y = f(x - 3)$ $y = 3f(x)$ $y = 3 - f(x)$ $y = f(-3x)$

How many of these graphs necessarily intersect the *x*-axis at exactly two distinct points?

A 0 B 1 C 2 D 3 E 4 F 5

9. Which of the following is a sketch of $y^2 - x^4 = 4$



10. The graph of a quadratic curve has equation $y = a + bx - x^2$

The image of the curve when reflected in the y-axis is identical to the image of the curve when translated 3 units in the negative x-direction. What is the value of b?

A $b = -3$

B $b = -1$

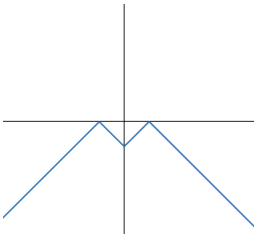
C $b = 1$

D $b = 3$

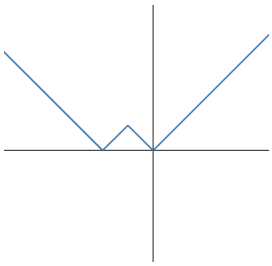
E $b = 9$

11. A sketch of the curve with equation $y = 1 - \left|1 - |x|\right|$ is drawn in:

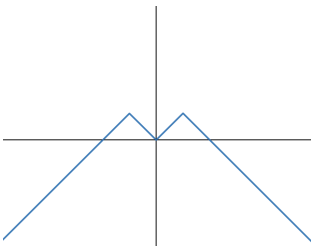
A



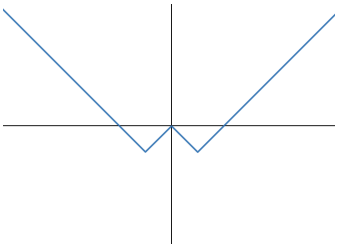
B



C



D



12. The function f is such that $f(x) = \dfrac{x-k}{x^2-4x-k}$, $x \in \mathbb{R}$ where k is a constant, and $x^2 - 4x - k \neq 0$

Given that the **range** of $f(x)$ is all the real numbers, what are the possible values of k?

A $-5 \leq k \leq 5$

B $k \leq -5$, $k \geq 5$

C $0 \leq k \leq 5$

D $k \leq 0$, $k \geq 5$

E $k = 0$ *or* $k = 5$

13. Consider the following function $f(x) = \dfrac{x^2 + 3x + 2}{x + 4}$

What can be said about the asymptote(s) of the graph of this function?

A The graph has an asymptote at $x = -4$

B The graph has asymptotes at $x = -4$ and at $y = x - 1$

C The graph has asymptotes at $x = -4$ and at $y = x$

D The graph has asymptotes at $x = 0$ and at $y = x$

E The graph has asymptotes at $x = 0$ and at $y = \dfrac{1}{2}$

14. The graph of a quadratic function $f(x)$ has a maximum point at (3,5)

The graph $y = f(x)$ is transformed onto the graph of $y = g(x)$ so that the graph of $g(x)$ has a minimum point at the origin. What is the equation for $g(x)$?

A $5 - f(x - 3)$

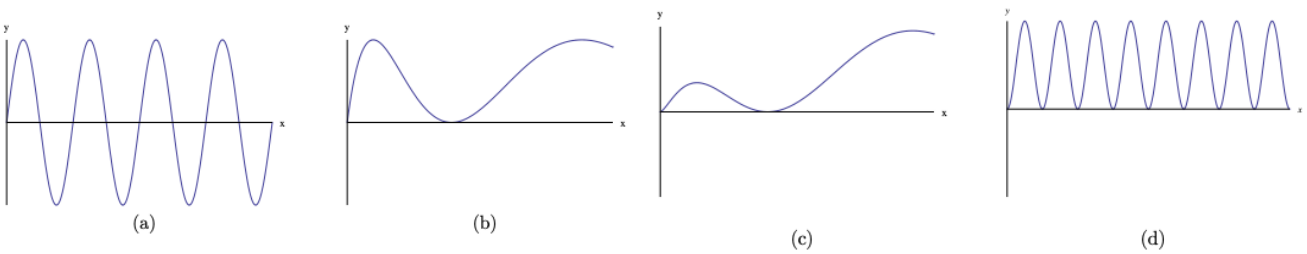
B $5 - f(x + 3)$

C $5 - f(3 - x)$

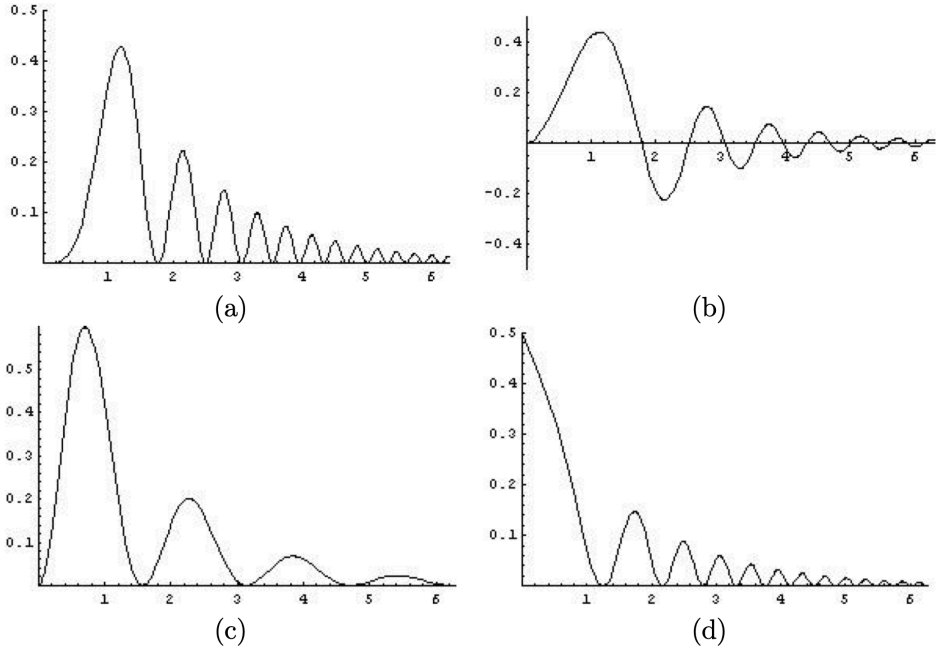
D $f(x + 3) - 5$

E $f(3 - x) - 5$

15. Which is the graph of $y = sin^2\sqrt{x}$



16. Which of the following is a sketch of the graph $y = 2^{-x}sin^2(x^2)$



17. Which of the following is a sketch of $y = log_{10}(x^2 - 2x + 2)$