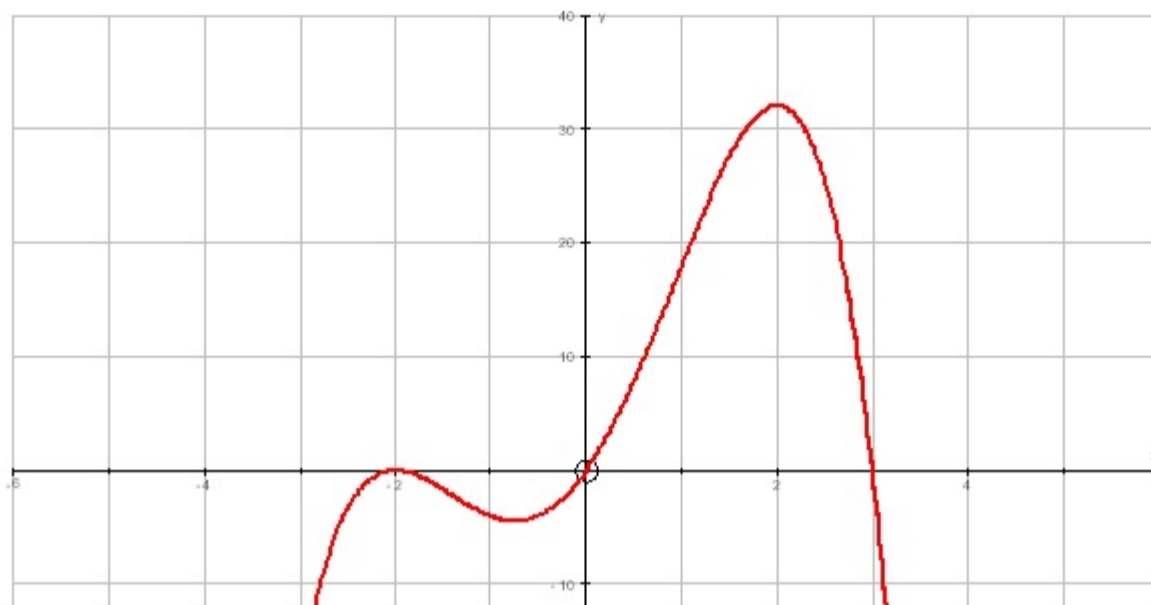


Midterm Exam Menihek High School 2013

Choose the best answer. 2 marks each

1 Given the graph below, which statement is true of the polynomial function?

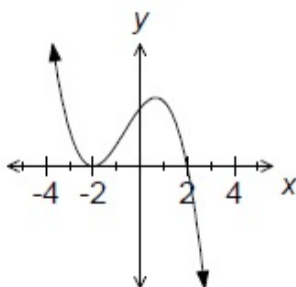


	Degree	Value of Leading Coefficient
A)	3	positive
B)	3	negative
C)	4	positive
D)	4	negative

2 Given a polynomial function $P(x)$ with $P(-3) = 0$, which is a factor of $P(x)$?

- A) -3
- B) 3
- C) $x - 3$
- D) $x + 3$

3 Which polynomial function best represents the graph shown below?



- (A) $f(x) = -(x-2)(x+2)^2$
- (B) $f(x) = -(x-2)^2(x+2)$
- (C) $f(x) = (x-2)(x+2)^2$
- (D) $f(x) = (x-2)^2(x+2)$

4

Which polynomial equation has a single root at $x = -3$ and a double root at $x = 2$?

- (A) $x^3 - 4x^2 - 3x + 18 = 0$
 (B) $x^3 - x^2 - 8x + 12 = 0$
 (C) $x^3 + x^2 - 8x - 12 = 0$
 (D) $x^3 + 4x^2 - 3x - 18 = 0$

5

What are the x-intercepts of the graph of the function $f(x) = 2x^3 + 3x^2 - 2x - 3$?

- (A) $\{-\frac{3}{2}, -1, 1\}$
 (B) $\{-\frac{3}{2}, 1, 1\}$
 (C) $\{-1, -1, \frac{3}{2}\}$
 (D) $\{-1, 1, \frac{3}{2}\}$

6

What is the remainder when the function $f(x) = 4x^7 - 6x^2 + 1$ is divided by $(x+1)$?

- A) -9
 B) -1
 C) 3
 D) 11

7

Which is true of the function $(y - 6) = -4 f(5x+20)$?

	Horizontal Stretch	Vertical Stretch
A)	$\frac{1}{5}$	-4
B)	$\frac{1}{5}$	4
C)	5	-4
D)	5	$\frac{1}{4}$

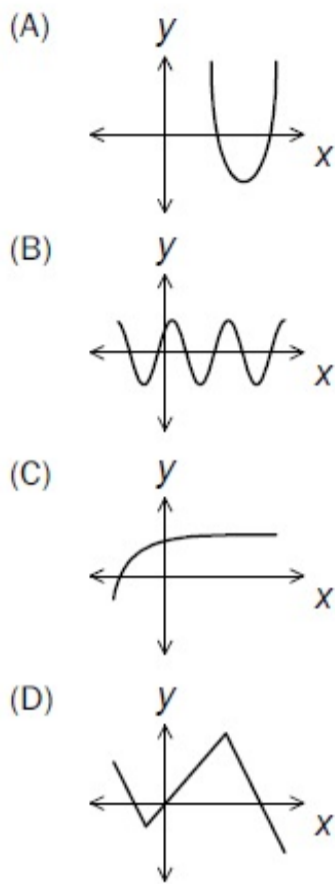
8

If $y = f(x)$ is transformed to $y = -2f(4x-12)+5$ what is the mapping rule used?

- A) $(x,y) \rightarrow (4x+12, -2y+5)$
 B) $(x,y) \rightarrow (4x-12, -2y-5)$
 C) $(x,y) \rightarrow (\frac{1}{4}x - 3, -\frac{1}{2}y + 5)$
 D) $(x,y) \rightarrow (\frac{1}{4}x + 3, -2y + 5)$

9

Which graph has an inverse that is also a function?



10 The point $(-2, 4)$ is on the graph of $y = f(x)$. What are the coordinates of the image point under the transformation $y - 2 = -3f(-x + 4)$?

- A) $(-2, -10)$
 B) $(-6, -10)$
 C) $(6, -12)$
 D) $(6, -14)$

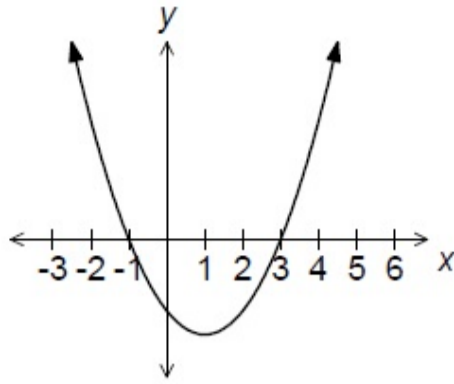
11

What is the inverse of $y = 2x^2 - 8$?

- (A) $x = \pm \sqrt{\frac{y+8}{2}}$
 (B) $x = \pm \sqrt{\frac{1}{2}y+8}$
 (C) $y = \pm \sqrt{\frac{x+8}{2}}$
 (D) $y = \pm \sqrt{\frac{1}{2}x+8}$

12

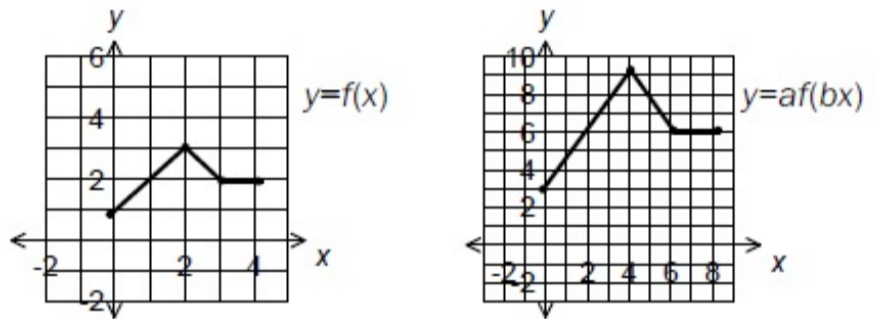
What are the zeros of the function $y = f(x)$ after the transformation $f\left(-\frac{1}{2}x\right)$?



- (A) $\{-6, 2\}$
- (B) $\{-2, 6\}$
- (C) $\{-\frac{3}{2}, \frac{1}{2}\}$
- (D) $\{-\frac{1}{2}, \frac{3}{2}\}$

13

What is the horizontal stretch of $y = af(bx)$ as compared to $y = f(x)$?



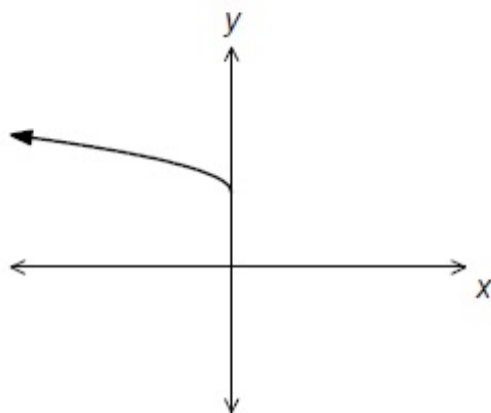
- (A) $\frac{1}{3}$
- (B) $\frac{1}{2}$
- (C) 2
- (D) 3

14 The domain of $y = f(x)$ is $[-4, 12]$ and range is $[0, 16]$. What is the value of b in the transformation of $y = af(bx)$ if the new domain is $[-8, 24]$ and the range is now $[0, -8]$?

- A) -2
- B) $-\frac{1}{2}$
- C) $\frac{1}{2}$
- D) 2

15

Which function best represents the graph shown below?



- (A) $y = \sqrt{-x} - 3$
- (B) $y = \sqrt{-x} + 3$
- (C) $y = -\sqrt{x} - 3$
- (D) $y = -\sqrt{x} + 3$

16

What are all of the invariant points for the graphs of $f(x) = 4x^2 + 3x$ and $y = \sqrt{f(x)}$?

- (A) $(-1, 1), (-\frac{3}{4}, 0), (0, 0), (\frac{1}{4}, 1)$
- (B) $(-1, 1), (\frac{1}{4}, 1)$
- (C) $(-\frac{3}{4}, 0), (0, 0)$
- (D) $(0, 0), (1, 7)$

17

The function $y = \sqrt{x}$ is stretched horizontally by a factor of 4, reflected in the y-axis and translated 8 units left. What is the domain of the transformed function?

- A) $(-8, 0)$
- B) $(-8, \infty)$
- C) $[-8, \infty)$
- D) $(-\infty, -8]$

18

Which graph represents an angle measuring $\frac{5\pi}{3}$?

- (A)
- (B)
- (C)
- (D)

- 19 In what quadrant does θ lie if $\sec \theta > 0$ and $\csc \theta < 0$?
- A) I
 - B) II
 - C) III
 - D) IV
- 20 A circle has a diameter of 20 units with center at the origin. What is the length of an arc that a 120° angle subtends?
- A) $\frac{2\pi}{3}$
 - B) $\frac{10\pi}{3}$
 - C) $\frac{20\pi}{3}$
 - D) $\frac{40\pi}{3}$
- 21 Evaluate: $\cot \pi$
- A) -1
 - B) 0
 - C) 1
 - D) undefined
- 22 What is $\frac{11\pi}{9}$ in degree measure?
- A) 10°
 - B) 20°
 - C) 210°
 - D) 220°
- 23 What is the exact value $\sec -135^\circ$?
- A) $-\sqrt{2}$
 - B) $\sqrt{2}$
 - C) $\frac{-1}{\sqrt{2}}$
 - D) $-\frac{2\sqrt{3}}{3}$

24 What is period of $y = -2 \cos 3(x - 30^\circ) + 4$?

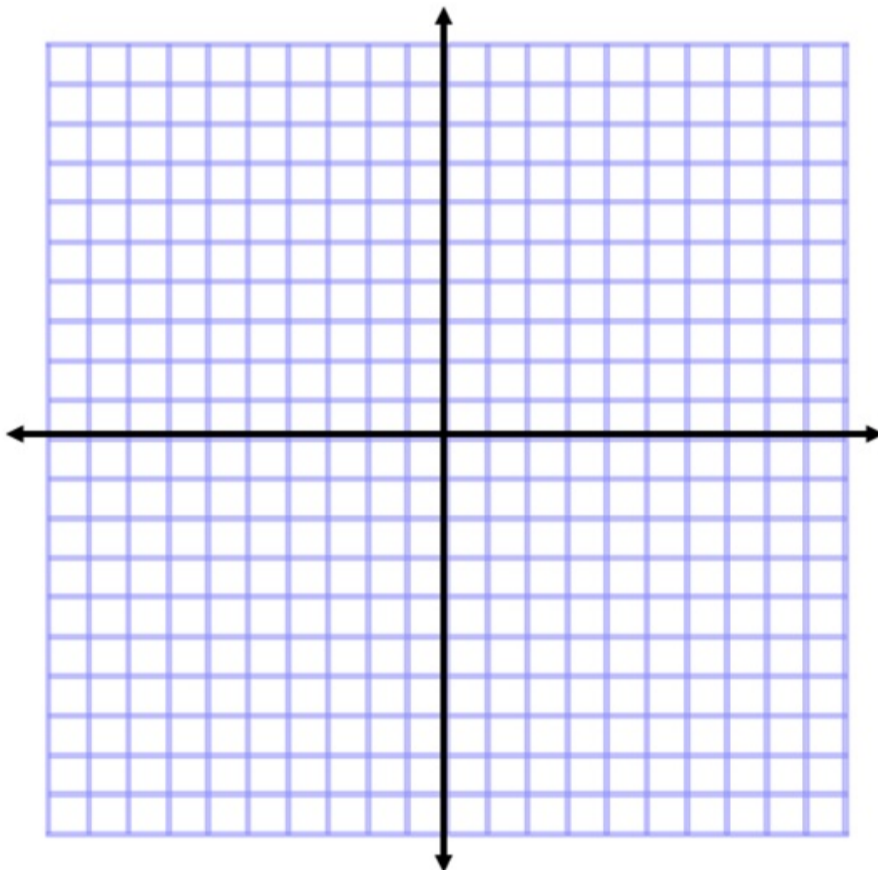
- A) 60°
- B) 120°
- C) 180°
- D) 540°

25 What is the range of the graph $y = 5 \sin 2(x + 45^\circ) - 1$?

- A) $[-6, -1]$
- B) $[-6, 4]$
- C) $[-1, 4]$
- D) $[-5, -4]$

Part II

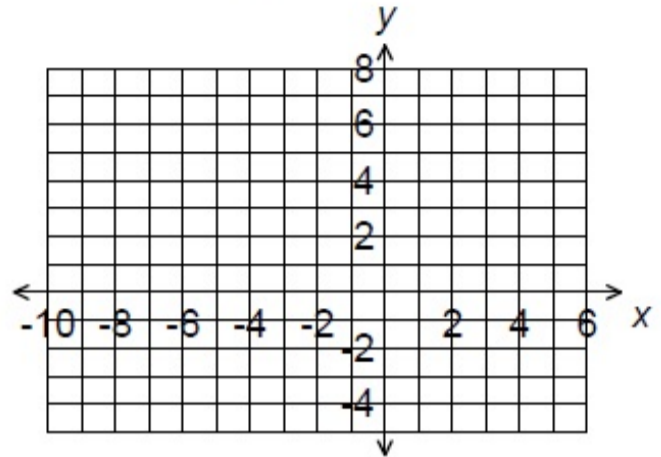
1 Sketch the graph of $y = x^3 - 3x - 2$ clearly labeling the x and y intercepts. 8 marks



2

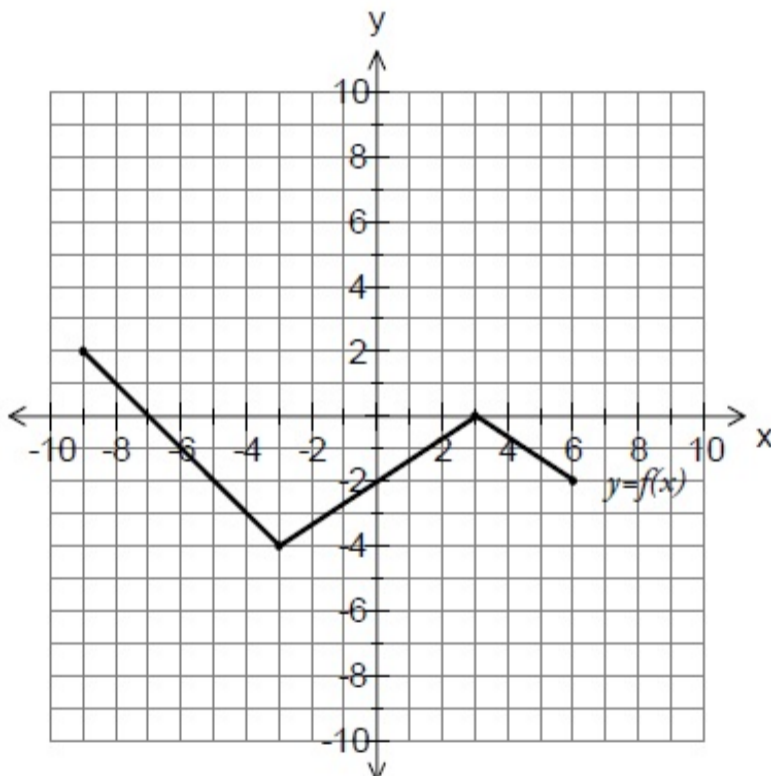
8 marks

The graph of $y = f(x)$ with points $A(5, 3)$, $B(3, 6)$, $C(-1, -3)$ is transformed so that $A'(-9, -1)$, $B'(-5, 0)$, $C'(3, -3)$. Plot the points and determine the equation of the image function in the form $y = af(b(x-h)) + k$.



3

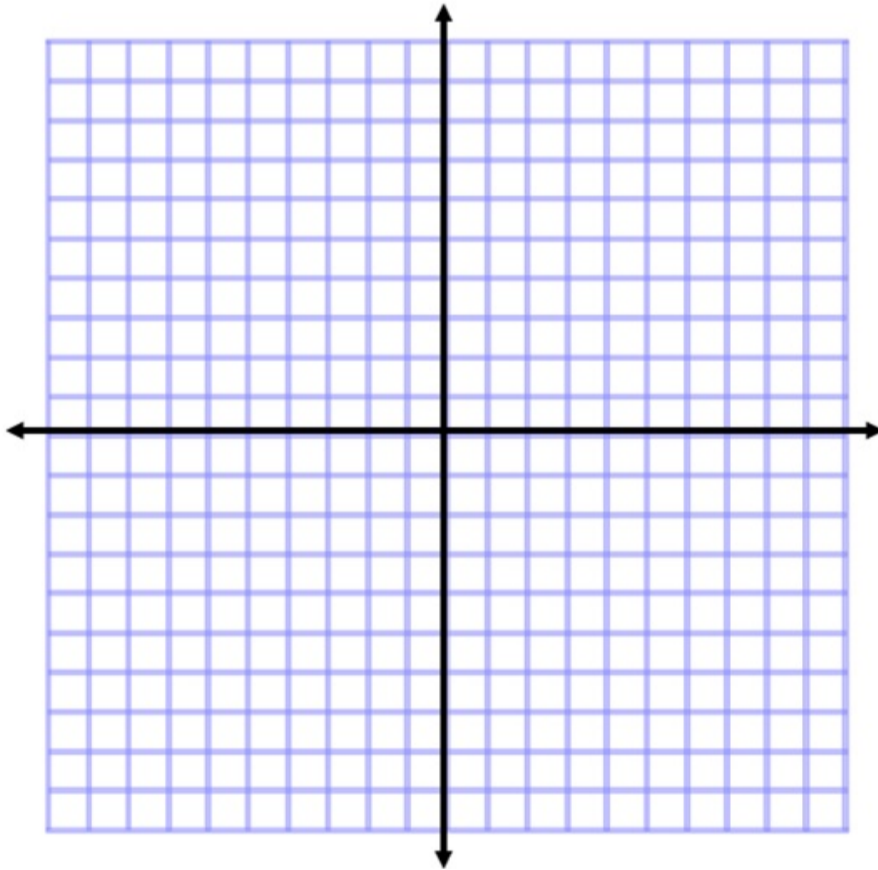
Given the graph of $y = f(x)$ below, sketch the graph of the transformation $y = -2f(-2(x-4)) + 1$ by using a table of values for the key points of $y = f(x)$ and a mapping rule. 6 marks



4 Given the function $f(x) = x^2 - 9$,

A) Restrict the domain on $f(x)$ so that $f^{-1}(x)$ is a function. 1 mark

B) Sketch $y = f(x)$ and $y = \sqrt{x}$ on the same coordinate axis. 4 marks



- 5 Algebraically determine the exact value of the expression below. Completely simplify the expression. 7 marks

$$\frac{\cot \frac{\pi}{3} + \cos^2 \frac{9\pi}{4}}{\csc(-30^\circ)}$$

- 6 Either 8 marks

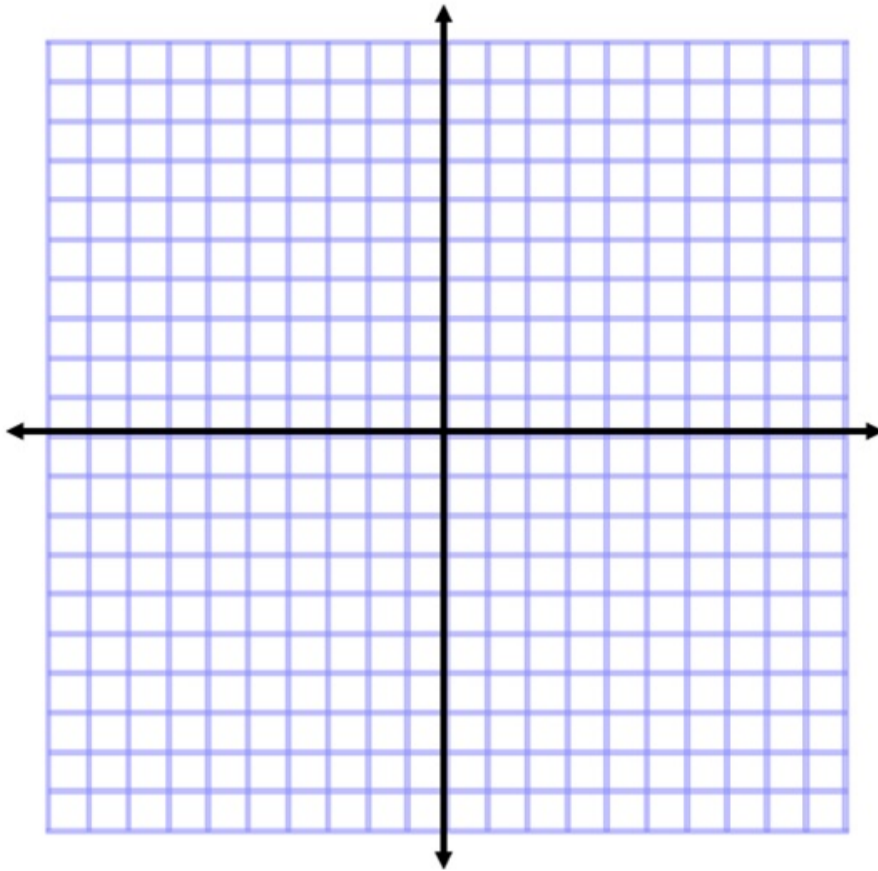
Solve for all θ in **radian** measure

$$2 \cos^2 x + 5 \cos x - 3 = 0$$

Or

The point $\left(-\frac{\sqrt{3}}{2}, y\right)$ lies on the terminal arm of θ on the unit circle. If $0^\circ < x < 360^\circ$ and θ is a third quadrant angle, determine exact values for all trigonometric ratios and the measure of θ .

- 7 Sketch the graph of $y = 4 \cos 2(x - 60^\circ) + 1$. State the requested information below. 8 marks



- A) Period=
- B) Amplitude =
- C) Mapping Rule:
- D) Phase shift:
- E) Domain and Range:
- F) Equation of the Sinusoidal Axis:

End