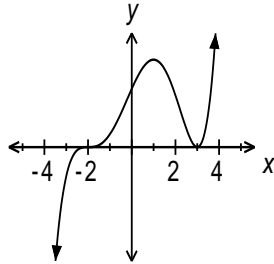


PART I
Total Value: 50%

Answer all items. Shade the letter of the correct answer on the computer scorable answer sheet.

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

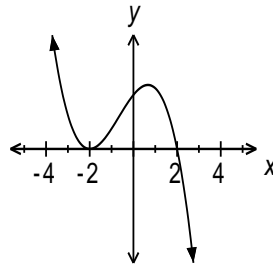


	Degree	Value of leading coefficient
(A)	3	negative
(B)	3	positive
(C)	5	negative
(D)	5	positive

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

- (A) -2
- (B) 2
- (C) $x - 2$
- (D) $x + 2$

3. Which polynomial function best represents the graph shown below?

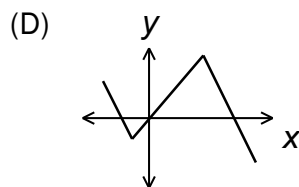
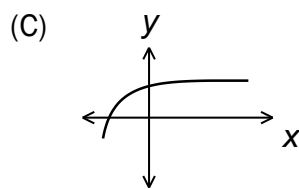
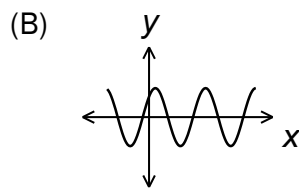
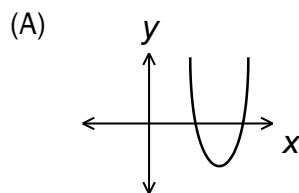


- (A) $f(x) = -(x-2)(x+2)^2$
- (B) $f(x) = -(x-2)^2(x+2)$
- (C) $f(x) = (x-2)(x+2)^2$
- (D) $f(x) = (x-2)^2(x+2)$
4. Which polynomial equation has a single root at $x = -3$ and a double root at $x = 2$?
- (A) $x^3 - 4x^2 - 3x + 18 = 0$
- (B) $x^3 - x^2 - 8x + 12 = 0$
- (C) $x^3 + x^2 - 8x - 12 = 0$
- (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) $\left\{-\frac{3}{2}, -1, 1\right\}$
- (B) $\left\{-\frac{3}{2}, 1, 1\right\}$
- (C) $\left\{-1, -1, \frac{3}{2}\right\}$
- (D) $\left\{-1, 1, \frac{3}{2}\right\}$
6. When the function $f(x) = x^5 + 4x^2 + 8$ is divided by $(x-2)$, what is the remainder?
- (A) -40
- (B) -8
- (C) 24
- (D) 56

7. Which is true of the function $y + 2 = -3f(4x + 8)$?

	Horizontal stretch	Vertical stretch
(A)	$\frac{1}{4}$	-3
(B)	$\frac{1}{4}$	3
(C)	4	-3
(D)	4	$\frac{1}{3}$

8. Which graph has an inverse that is also a function?



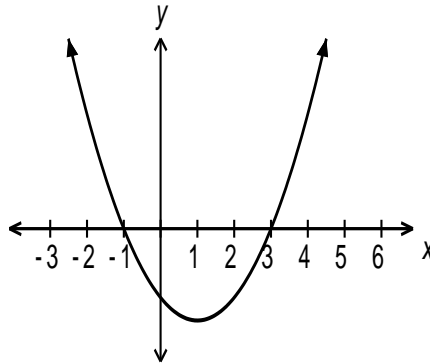
9. The point $(2, -3)$ is on the graph of $y = f(x)$. What is its image point under the transformation $y + 1 = -2f(x - 3)$ of the graph of $f(x)$?

- (A) $(-1, 7)$
- (B) $(5, \frac{1}{2})$
- (C) $(5, \frac{5}{2})$
- (D) $(5, 5)$

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

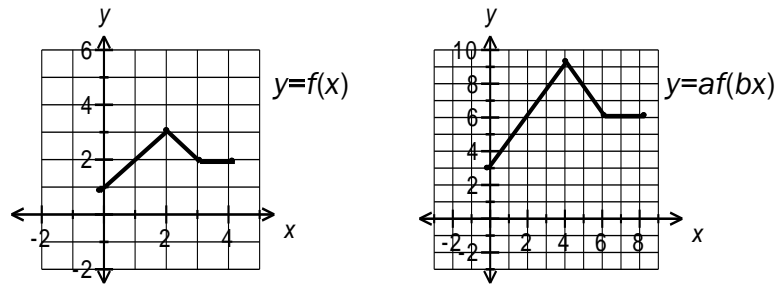
- (A) $x = \pm \sqrt{\frac{y+8}{2}}$
- (B) $x = \pm \sqrt{\frac{1}{2}y + 8}$
- (C) $y = \pm \sqrt{\frac{x+8}{2}}$
- (D) $y = \pm \sqrt{\frac{1}{2}x + 8}$

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

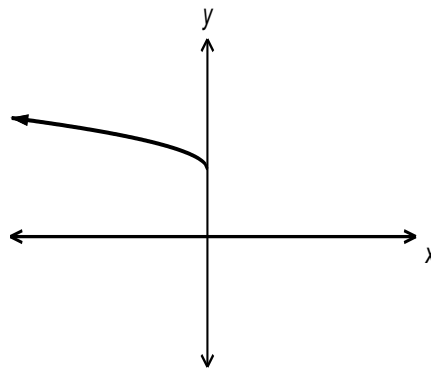


- (A) $\{-6, 2\}$
- (B) $\{-2, 6\}$
- (C) $\{-\frac{3}{2}, \frac{1}{2}\}$
- (D) $\{-\frac{1}{2}, \frac{3}{2}\}$

12. 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
13. Which function best represents the graph shown below?



- (A) $y = \sqrt{-x} - 3$
 (B) $y = \sqrt{-x} + 3$
 (C) $y = -\sqrt{x} - 3$
 (D) $y = -\sqrt{x} + 3$
14. 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) $(0, 0), (1, 7)$

15. The graph of the function $y = \sqrt{x}$ is stretched horizontally by a factor of 2 and translated 3 units left. What is the domain of the transformed function?

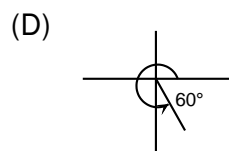
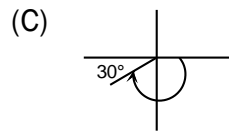
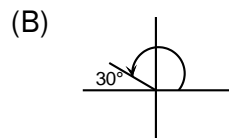
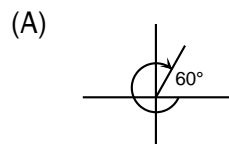
(A) $\{x \mid x \geq -3, x \in R\}$

(B) $\{x \mid x \geq -\frac{3}{2}, x \in R\}$

(C) $\{x \mid x \geq -1, x \in R\}$

(D) $\{x \mid x \geq \frac{3}{2}, x \in R\}$

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



17. In which quadrant is $\csc\theta > 0$ and $\cos\theta < 0$?

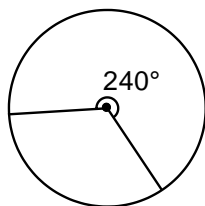
- (A) I
- (B) II
- (C) III
- (D) IV

18. What is 440° written in radian measure?

- (A) $\frac{11\pi}{9}$
- (B) $\frac{22\pi}{9}$
- (C) $\frac{44\pi}{9}$
- (D) $\frac{88\pi}{9}$

19. What is the length of the arc cut by a 240° sector in a circle having diameter 10 cm?

- (A) $\frac{10\pi}{3}$
- (B) $\frac{20\pi}{3}$
- (C) $\frac{30\pi}{3}$
- (D) $\frac{40\pi}{3}$



20. Given $P(7, -24)$ are the coordinates on the terminal arm of an angle θ in standard position, what is $\csc\theta$?

- (A) $-\frac{25}{24}$
- (B) $-\frac{24}{25}$
- (C) $\frac{7}{25}$
- (D) $\frac{25}{7}$

21. Solve for x : $\sqrt{3}\sec x + 2 = 0$, where $0 \leq x < 2\pi$.

(A) $\frac{\pi}{6}, \frac{11\pi}{6}$

(B) $\frac{\pi}{3}, \frac{5\pi}{3}$

(C) $\frac{2\pi}{3}, \frac{4\pi}{3}$

(D) $\frac{5\pi}{6}, \frac{7\pi}{6}$

22. What is the domain of $y = \tan x$?

(A) $\{x \mid x \neq \frac{\pi}{4} + \pi n, n \in I, x \in R\}$

(B) $\{x \mid x \neq \frac{\pi}{4} + 2\pi n, n \in I, x \in R\}$

(C) $\{x \mid x \neq \frac{\pi}{2} + \pi n, n \in I, x \in R\}$

(D) $\{x \mid x \neq \frac{\pi}{2} + 2\pi n, n \in I, x \in R\}$

23. What is the period of $y = 4\cos\frac{1}{2}(x - 45^\circ)$?

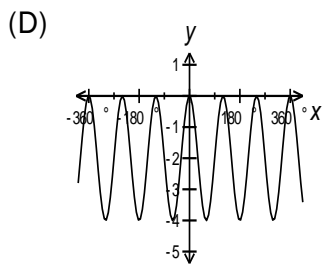
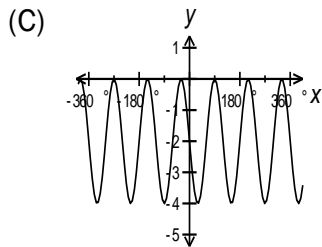
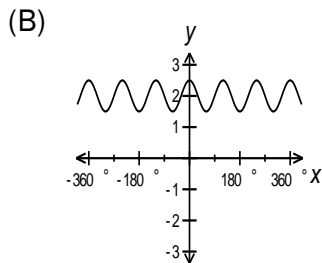
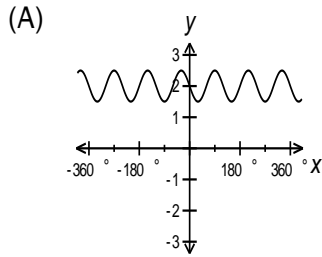
(A) $\frac{\pi}{2}$

(B) π

(C) 4π

(D) 8π

24. Which graph best represents the sinusoidal function $y = -2\sin 3(x - 30^\circ) - 2$?



25. What is the range of the function $y = \frac{1}{4}\cos 2\left(x - \frac{\pi}{4}\right) - 3$?

(A) $\{y \mid -7 \leq y \leq 1, y \in R\}$

(B) $\{y \mid -\frac{13}{4} \leq y \leq -\frac{11}{4}, y \in R\}$

(C) $\{y \mid -1 \leq y \leq 7, y \in R\}$

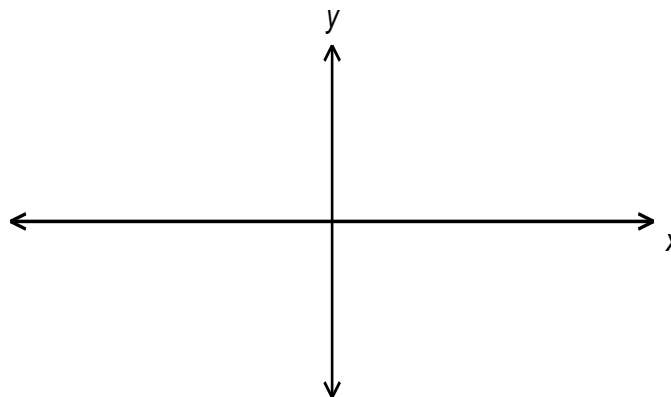
(D) $\{y \mid \frac{11}{4} \leq y \leq \frac{13}{4}, y \in R\}$

PART II
Total Value: 50%

Answer **ALL** items in the space provided. Show **ALL** workings.

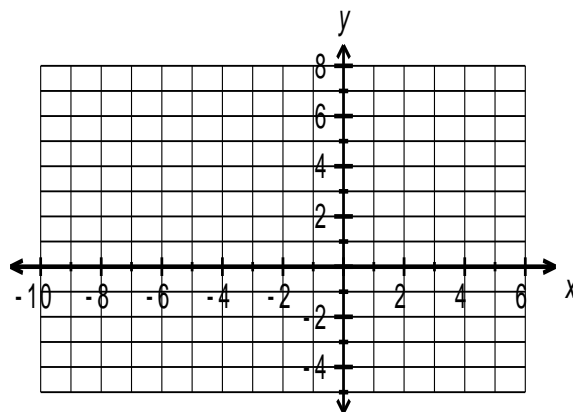
Value

- 4 51.(a) Sketch the graph of the function $y = 2x^3 - 5x^2 - 4x + 3$ and clearly label the x-intercept(s) and the y-intercept.



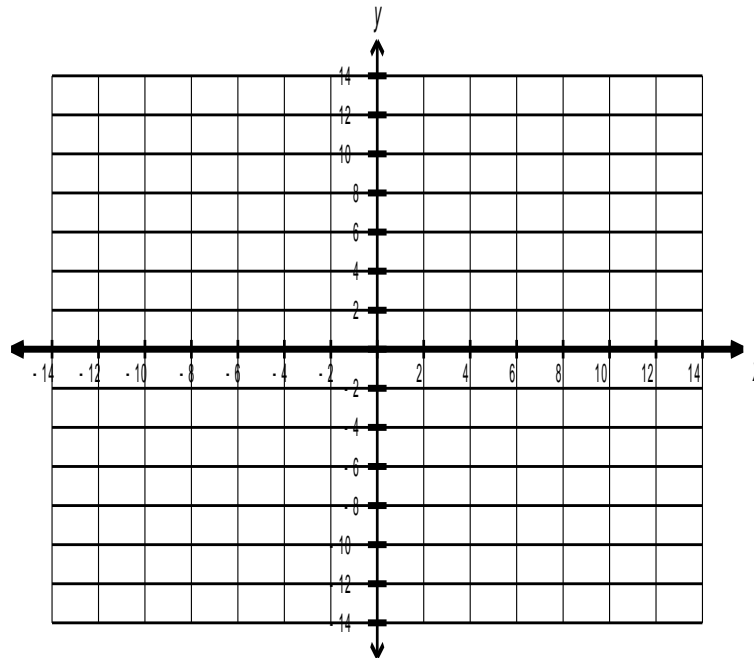
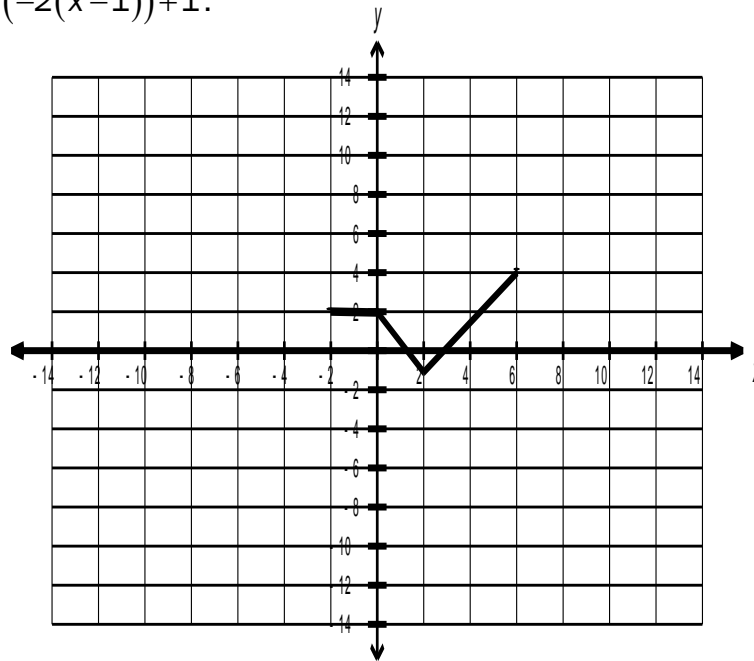
- 2 51.(b) The dimensions of a rectangular prism are given by $x + 2$, $x - 4$ and $x - 1$. Write an equation representing the volume in the form $f(x) = ax^3 + bx^2 + cx + d$. Identify and justify all inadmissible values for x .

- 3 52.(a) 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 $y = af(b(x - h)) + k$.



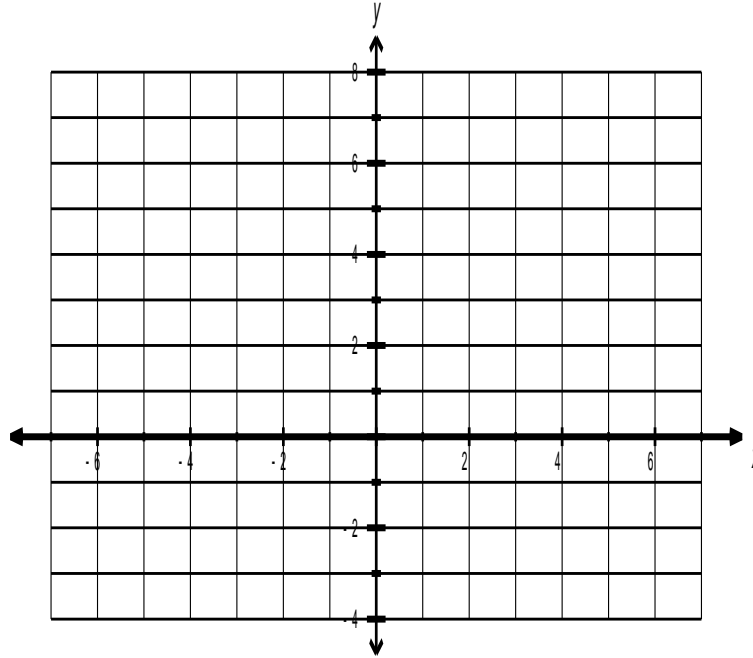
2

52.(b) Given the graph of the function $y = f(x)$ below, sketch the inverse graph of $y = 3f(-2(x-1)) + 1$.



Value

2 53.(a) Solve graphically: $\sqrt{25 - x^2} = 4$



2 53.(b) Use $f(x) = -px + q$ to answer the questions below.

(i) Determine the invariant points for $y = f(x)$ and $y = \sqrt{f(x)}$.

(ii) State the domain and range of $y = \sqrt{f(x)}$.

Value

4

54. Algebraically determine the exact value of:
(simplify completely)

$$\frac{\sec\left(\frac{11\pi}{6}\right) + \cot\left(\frac{8\pi}{3}\right)}{\sin(-150^\circ)}$$