

Multiple choice section. Circle the correct choice(s). You do not need to show your work for these problems.

1. Which of the following is a factor of $x^4 - x$? Circle all those that apply.

- (A) x (B) $x - 1$ (C) $x + 1$ (D) $x^2 + x + 1$ (E) $x^2 - x + 1$

2. How many roots does the equation below have?

$$x^2(x^2 - 3) - 4(x^2 - 3) = 0$$

- (A) 0 (B) 1 (C) 2 (D) 3 (E) 4

3.

$$\frac{1 + \frac{1}{x}}{1 - \frac{1}{x}} =$$

- (A) $\frac{x+1}{x-1}$ (B) $\frac{x-1}{x+1}$ (C) $x-1$ (D) $1-x$ (E) x

4. What is the radius of the circle whose equation is $x^2 - 8x + y^2 + 6y = 24$?

- (A) 4 (B) $\sqrt{24}$ (C) 5 (D) 6 (E) 7

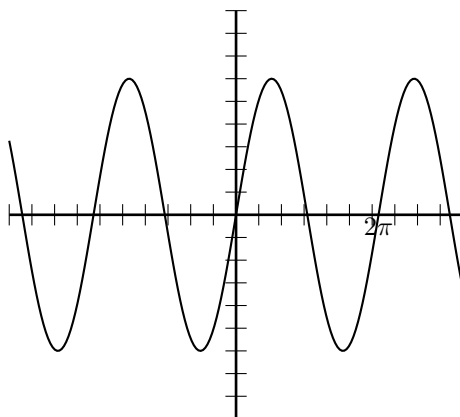
5. Which of the following is a solution to $2(5 - 3x) - 2.5 - 3x = 108$? Circle all that apply.

- (A) -12 (B) -9 (C) -2 (D) 0 (E) none of these

6. Which of the following is a solution to $3(x - 2)^2(x + 1) - 2(x - 2)^2(x + 1)^3 = 0$? Circle all that apply.

- (A) -2 (B) -1 (C) 0 (D) 2 (E) 8

7. Consider the function $y = a \sin(bx)$, where a and b are constants, shown below. What is $a + b$? (Tick marks are located at unit positions.)



- (A) 2 (B) 4 (C) 5 (D) 6 (E) 7

8. Suppose the functions f and g are given completely by the table of values shown below.

x	$f(x)$	x	$g(x)$
0	2	0	5
1	7	1	7
2	5	2	4
3	1	3	2
4	3	4	6
5	6	5	3
6	0	6	1
7	4	7	0

What is $g^{-1}(f(3))$?

- (A) 1 (B) 3 (C) 4 (D) 5 (E) 6

9. Referring again to the two functions in the previous question, solve the equation $g(f(g(x))) = 5$ for x .
(A) 1 (B) 2 (C) 3 (D) 4 (E) 5

On all the following questions, **Show your work.**

10. Find the (implied) domain of the function $g(x) = \frac{\sqrt{x+1}}{x^2-9}$. Write your answer using interval notation.
11. Let $f(x) = x^2 - x$. Compute in simplify $f(4)$, $f(x+1)$, $f(x+h)$, and $\frac{f(x+h) - f(x)}{h}$ where $h \neq 0$.
12. The slope of the tangent line to the graph of $f(x) = 2x^2 - x$ at the point $(1, 1)$ is 3. Find an equation for this tangent line.
13. (Why not?) Sketch the curve below represented parametrically by $x = t - \sin(2t)$, $y = t + \cos(t)$ for $-2 \leq t \leq 2$ on the grid provided.

