

College Algebra Math 1050

Sample Midterm Exam - Version 2

Name: _____

School: _____ Instructor: _____

Scientific (not graphing) calculators are allowed. Time limit is 75 minutes. The point value of each problem is written next to the problem. **You must show your work to receive any credit, except on problems 1–21.** Work neatly.

Fill in the blank or circle the correct answer.

1. (3 points) List all of the possible rational zeros (roots) of the polynomial

$$f(x) = 2x^4 - 3x^3 + x^2 + 4x - 3. \quad \underline{\hspace{8cm}}$$

2. (3 points) A subset of possible rational zeros (roots) of $g(x) = 3x^3 + 14x^2 - 47x + 14$ includes:

$$-1, -\frac{2}{3}, \frac{1}{3}, 14. \text{ Find a rational root of } g(x) \quad \underline{\hspace{8cm}}$$

3. (3 points) Given that $x = 2$ is a root (zero) of $h(x) = x^3 - 2x^2 - 5x + 10$ find the remaining roots (zeros) of the polynomial $h(x)$ _____

4. (3 points) A polynomial with real coefficients has a zero $x = 3i - 2$. Another zero is:
- _____

5. (3 points) Given the table shown, evaluate $(f + g)(2)$. _____

x	-3	-2	-1	0	1	2	3
$f(x)$	-7	-5	-3	-1	3	5	7
$g(x)$	8	3	0	-1	0	3	8

6. (3 points) List all solutions to the equation $|x - 2| = 1$. _____

7. (2 points) The solution of the inequality $|x| > 4$ in interval notation is _____

8. (4 points) Given the function $f(x) = \frac{x}{x-2}$ with the domain $D(f) = \{x \mid x \neq 2\}$ and the function $g(x) = \sqrt{x-1}$ with the domain $D(g) = \{x \mid x \geq 1\}$,

find the domain of the function $(f-g)(x)$. _____

9. (4 points) Write the difference quotient $DQ = \frac{f(x+h) - f(x)}{h}$ for the function

$f(x) = x^2 - 3x + 1$. Do not simplify. _____

10. (4 points) To simplify the difference quotient $DQ = \frac{\sqrt{x+h} - \sqrt{x}}{h}$ for the function $g(x) = \sqrt{x}$, which correctly describes a first step?

(a) Tornike's first step is: $\left(\frac{\sqrt{x+h} - \sqrt{x}}{h}\right) \left(\frac{\sqrt{x+h} + \sqrt{x}}{\sqrt{x+h} + \sqrt{x}}\right)$

(b) Rati's first step is: $\left(\frac{\sqrt{x+h} - \sqrt{x}}{h}\right)^2$

(c) Gocha's first step is: $\frac{\sqrt{x} + \sqrt{h} - \sqrt{x}}{h}$

(d) None is a correct step.

Circle all that apply.

For problems from 11 to 13, consider the function $f(x) = \frac{2x + 3}{x^2 + 5x + 6}$.

11. (1 point) The domain of the function $f(x)$ is _____.

12. (1 point) The x -intercept(s) of $f(x)$ is (are) _____. Write your answer(s) as ordered pair(s).

13. (1 point) The y -intercept(s) of $f(x)$ is (are) _____. Write your answer(s) as ordered pair(s).

For problems from 14 to 15, consider the function $g(x) = \frac{x^2 + x + 2}{x + 3}$. **Write your answer(s) in equation form.**

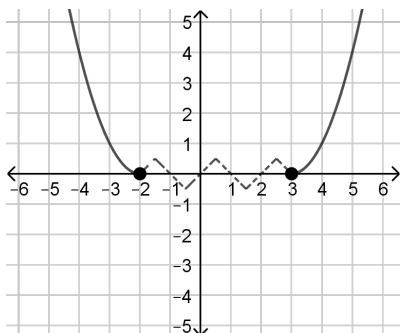
14. (2 points) The vertical asymptote(s), if any, of the function $g(x)$ is (are) _____.

15. (2 points) The non-vertical asymptote(s), if any, of the function $g(x)$ is (are) _____.

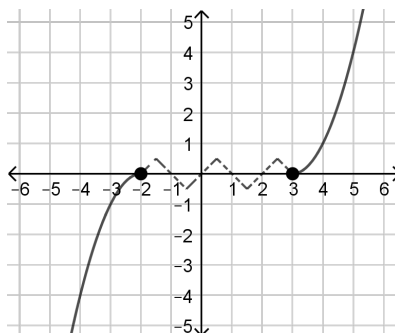
16. (3 points) Consider the polynomial function $f(x) = (x+4)(x-3)(x-2)$. Find the x -intercepts of the function. **Write your answers as ordered pairs.** _____

17. (3 points) Consider the polynomial function $f(x) = (x - 1)^2(x - 3)(x + 2)^2$. Which choice best describes the end behavior? Circle all that apply.

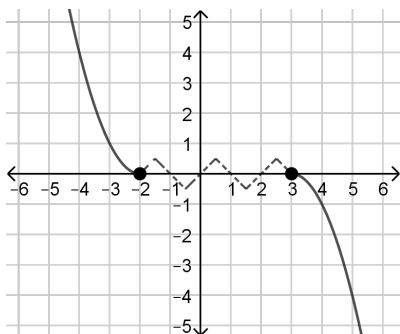
(a)



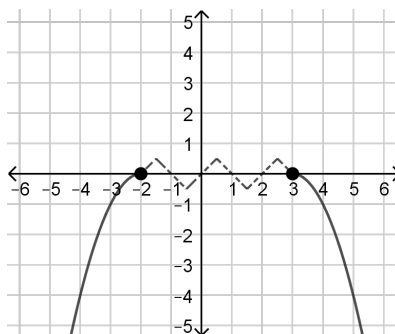
(b)



(c)



(d)



18. (4 points) $h(t) = -t^2 + 4t + 7$ represents the height of a ball, in meters, thrown vertically t seconds after it was thrown. After how many seconds does the ball reach its maximum height?

19. (3 points) Consider the inequality $\frac{1}{x + 1} < \frac{2}{x - 3}$. Which correctly describes a first step in solving the inequality?

- (a) Baba's first step to solve the inequality is: $\frac{x + 1}{1} < \frac{x - 3}{2}$
- (b) Zorba's first step to solve the inequality is: $x - 3 < 2(x + 1)$
- (c) Levan's first step to solve the inequality is: $\frac{1}{x + 1} - \frac{2}{x - 3} < 0$
- (d) None is a correct step.

Circle all that apply.

20. (3 points) The rational expression $\frac{x^2 - 4x + 3}{x + 2}$ has critical numbers at $x = -2$, $x = 1$, and $x = 3$. Find the solution to the inequality $\frac{x^2 - 4x + 3}{x + 2} \leq 0$. Write the solution in interval form.

21. (4 points) Consider the inequality $|x - 1| + 2 \geq 7$. Which correctly describes a first step in solving the inequality?

(a) Nana's first step to solve the inequality is: $7 \geq x - 1 + 2 \geq -7$.

(b) Leli's first step to solve the inequality is: $-7 \leq x - 1 + 2 \leq 7$.

(c) Tina's first step to solve the inequality is: $|x - 1| \geq 5$

(d) None is a correct step.

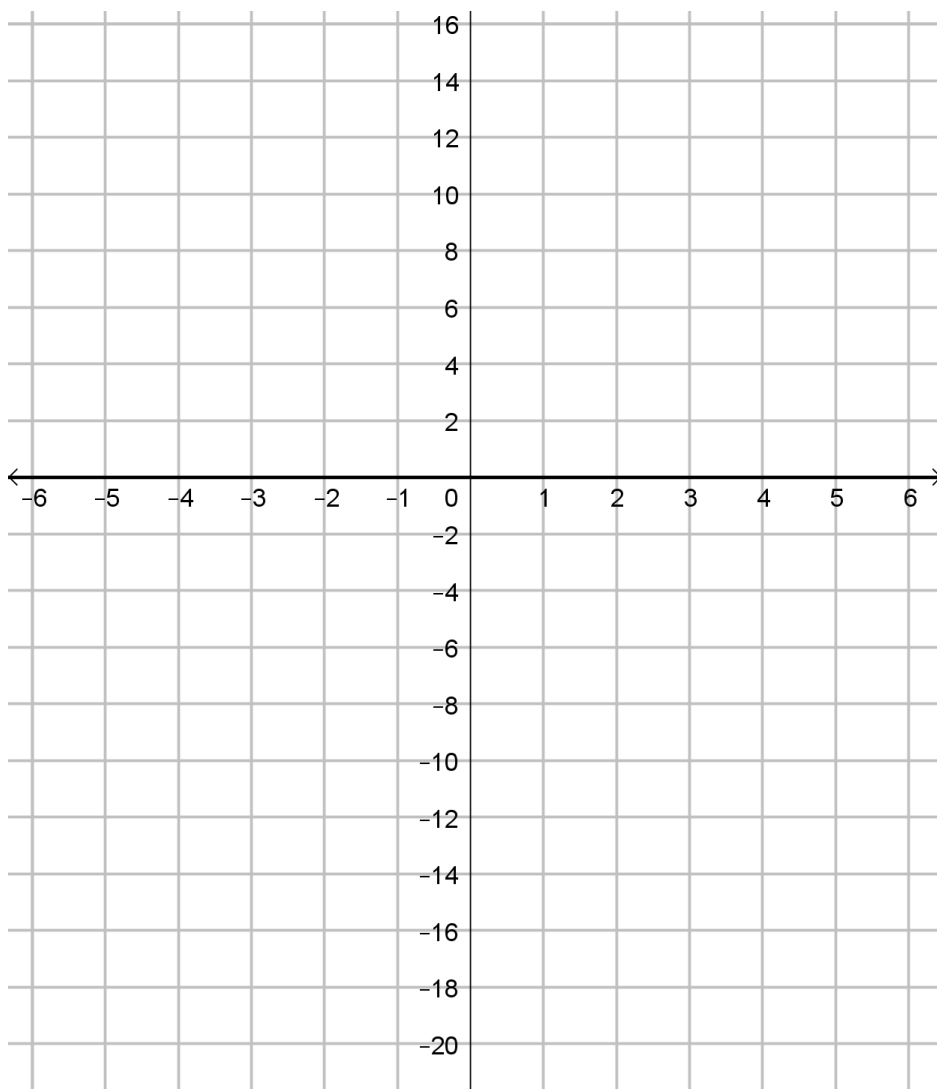
Circle all that apply.

22. (8 points) Solve the inequality. State the solution in interval notation.

$$2x - 1 > \frac{1}{x}.$$

22. Answer _____

23. (9 points) Graph the rational function $f(x) = \frac{x + 3}{x^2 - x - 6}$. Your graph should clearly show and label all x and y intercepts and asymptotes.



24. (8 points) Solve the inequality. State the solution in interval notation.

$$|2 - x| - 3 > 4$$

24. Answer _____

25. (8 points) An appliance wholesaler finds the number x of appliances she can sell each week is related to the price p by the equation $x = 1000 - p$, $0 \leq p \leq 1000$. What is the maximum revenue R ? ($R = xp$) **Justify your answer.**

25. Answer _____

26. (8 points) Sketch the graph the polynomial function $y = (x - 2)(x + 3)^2(x + 5)$ on the axis below. Your graph should show and label all x -intercepts, y -intercepts, and the end behavior.

