Jumbled Together Quiz Questions

All of your quiz questions jumbled together (i.e. out of order). Use this to study “How to recognize how to start each question,” Note there are several sections we never had quiz questions on, so those sections don’t appear here.

This is NOT enough to study for the final. The only point of this is to be able to answer problems that appear jumbled together from all sections. I did NOT pick these questions to represent what is on the final. I just shuffled together quiz questions I gave my sections.

1. Write the set using interval notation:
   (a) \( \{x \mid x \leq -1 \text{ or } x \geq 1\} \)
   (b) \( \{x \mid x \leq 5 \text{ or } x = 6\} \)

2. Let \( f(x) = 2 - x^2 \). Find and simplify the following:
   (a) \( f(x - 4) \)
   (b) \( 4f(x) \)

3. Let \( f(x) = \frac{3}{1 - x} \) and \( g(x) = \frac{4x}{x^2 + 1} \)
   (a) Find \( (g \circ f)(0) \)
   (b) Find \( (f \circ g)(\frac{1}{2}) \)

4. (a) For \( f(x) = \frac{x}{x - 1} \), find and simplify \( f(\frac{3}{2}) \)
   (b) For \( f(x) = x^2 - 3x + 2 \), find and simplify \( f(x - 4) \)

5. Let \( f(x) = 3 - x^2 \) and \( g(x) = \sqrt{x + 1} \).
   Find a simple expression for \( g(f(x)) \) and write its domain using interval notation.

6. Let \( P \left( -\frac{2}{3}, \frac{3}{2} \right) \) and \( Q \left( \frac{7}{3}, 2 \right) \) be 2 points on the coordinate plane.
   (a) Find the distance between \( P \) and \( Q \). Simplify your answer
   (b) Find the midpoint \( M \) between \( P \) and \( Q \). Simplify your answer

7. Use completion of squares to write the polynomial \( x^2 + 5x - 1 \) in the form \( a(x + b)^2 + c \).

8. Find all of the points on the \( x \)-axis which are 2 units from the point \((-1, 1)\).

9. For \( f(x) = \frac{x}{1 - 3x} \)
   (a) Show that \( f(x) \) is one-to-one.
   (b) Find \( f^{-1}(x) \), simplify your answer.
   (c) Find the domain and range of \( f \) use interval notation.
   (d) Find the domain and range of \( f^{-1} \) use interval notation.
10. Find the domain of \( f(x) = x\sqrt{x^2 - 1} \)

11. Find the domain of the following functions. Write your answer in interval notation
   (a) \( f(x) = \frac{2x}{x^2 + 3} \)
   (b) \( f(x) = \sqrt{6x - 2} \)

12. Let \( f(x) = -x^2 + x + 6 \) and \( g(x) = x^2 - 9 \) and \( h(x) = \left( \frac{f}{g} \right)(x) \).
   (a) Find a simple expression for \( h(x) \).
   (b) State the domain of \( h(x) \), using interval notation.

13. Let \( f(x) = \frac{x^3 + 2x^2 + x}{x^2 - x - 2} \)
   (a) Find the domain of \( f \)
   (b) Identify any vertical asymptotes of the graph of \( y = f(x) \). (if none, say ‘none’)
   (c) Identify any holes in the graph. (if none, say ‘none’)
   (d) Find the horizontal asymptote. (if none, say ‘none’)

14. Find the \( x \)- and \( y \)-intercepts of the following graphs. If there are none, say ‘none,’
   (a) \((x + 2)^2 + y^2 = 16\)
   (b) \(y = 2\sqrt{x + 4} - 2\)

15. For \( p(x) = 5x^4 - 3x^3 + 2x^2 - 1 \) and \( d(x) = x^2 + 4 \), use polynomial long division to write the polynomial \( p(x) \) in the form \( p(x) = d(x)q(x) + r(x) \).

16. Let \( p(x) = 2x^3 - 3x^2 - 11x + 6 \), given that \( p\left(\frac{1}{2}\right) = 0 \),
   (a) Factor \( p(x) \)
   (b) Find all real solutions to \( p(x) = 0 \)

17. Graph the relation \( \{(m, 2m) | m = 0, \pm 1, \pm 2\} \)

18. For \( g(x) = -x^5 - 3 \) and \( f(x) = x^5 \), graph \( g \) as a transformation of \( f \). Track at least 3 points, and state the domain and range of \( g \).

19. Sketch the graph of the function
   \[
   f(x) = \begin{cases} 
   4 - x & \text{if } x \leq 3 \\
   2 & \text{if } x > 3
   \end{cases}
   \]

20. For \( f(x) = \frac{3x^2 - 5x - 2}{x^2 - 9} \),
   (a) Find the domain
   (b) Find \( x \)- and \( y \)-intercepts of the graph of \( f(x) \) (if any)
   (c) Find vertical and horizontal asymptotes of the graph of \( f(x) \), (if any)
   (d) Find the holes of the of the graph of \( f(x) \) (if any)
   (e) Use the above and any other information you need to sketch the graph \( f(x) \). (Make sure to indicate asymptotes as dashed lines).
21. Let \( f(x) = \frac{1}{3}|2x - 1| \)
   (a) Sketch the graph of \( f(x) \)
   (b) Find the domain and range of \( f(x) \)
   (c) Find the coordinates of the \( x \)- and \( y \)-intercepts (if any) of the graph of \( f(x) \).
   (d) Find the local maxima and minima of \( f(x) \), if none, say ‘none.’

22. Let \( f(x) = 2x^2 - 4x - 1 \)
   (a) Find the vertex of the parabola
   (b) Sketch the parabola
   (c) Does the vertex yield and absolute maximum or absolute minimum?

23. For \( h(x) = x^2(x - 2)^2(x + 2)^2 \),
   (a) Find the real zeros of the polynomial \( h \) and their corresponding multiplicities.
   (b) Find the sign chart for the polynomial \( h \).
   (c) Make a rough sketch of the graph \( h \).

24. Does the equation \( x^3 + y^3 = 4 \) represent \( y \) as a function of \( x \)? Justify Your Answer

25. Does the equation \( x^2 - y^2 = 4 \) represent \( y \) as a function of \( x \)? Justify Your Answer

26. For \( f(x) = 10^{2x^2 - 7} - 5 \)
   (a) Find \( f^{-1}(x) \).
   (b) Find the domain of \( f^{-1} \)
   (c) Find the range of \( f^{-1} \)

27. Determine analytically \( f(x) = \frac{x^2 - 3}{x - 4x^3} \) is even, odd or neither.
   Make sure to show work

28. For \( G(t) = 4(t - 2)^2(t + \frac{1}{2}) \), identify each of the following
   (a) degree
   (b) leading term
   (c) leading coefficient
   (d) constant term

29. Find and simplify the difference quotient \( \frac{f(x + h) - f(x)}{h} \) for the function
   \( f(x) = \sqrt{2x + 1} \). Hint: Rationalize the Numerator.

30. Create a polynomial \( p \) which has the desired characteristics. You may leave the polynomial in factored form.
   - The solutions to \( p(x) = 0 \) are \( x = 3 \), \( x = -3 \), and \( x = 6 \).
   - The leading term of \( p(x) \) is \( 7x^4 \).
   - The point \((-3, 0)\) is a local minimum of the graph of \( y = p(x) \).
31. Use the Rational Zeros Theorem to make a list of possible rational zeros of 

\[ f(x) = -2x^3 + 19x^2 - 49x + 20 \]

32. Solve the following equations (i.e. find all solutions to the given equation)

(a) \[ 4^x + 2^x = 12 \]

(b) \[ 4 - |x| = 2x + 1 \]

(c) \[ 2 \log_7(x) = \log_7(2) + \log_7(x + 12) \]

(d) \[ 9 \cdot 3^{7x} = (\frac{1}{3})^{2x} \]

(e) \[ x + \sqrt{3x + 10} = -2 \]

(f) \[ 7^{3+7x} = 3^{4-2x} \]

(g) \[ \log_5(2x + 1) + \log_5(x + 2) = 1 \]

33. Solve \[ y^2 - 3y = 4x \] for \( y \)

34. Find the real zeros of the polynomial \( f(x) = x^4 - 9x^2 + 14 \), State the multiplicity of each zero.

35. Find all real solutions to the equation \[ \frac{1}{x + 3} + \frac{1}{x - 3} = \frac{x^2 - 3}{x^2 - 9} \]

36. Solve the following inequalities, write your answer in interval notation.

(a) \[ |1 - 2x| \geq x + 5 \]

(b) \[ \frac{1 - \ln(x)}{x^2} < 0, \]

(c) \[ \frac{1}{3}x^\frac{3}{4}(x - 3)^{-\frac{3}{4}} + \frac{3}{4}x^{-\frac{1}{4}}(x - 3)^{\frac{1}{4}} < 0. \]

(d) \[ \frac{x^2 - x - 12}{x^2 + x - 6} > 0 \]

(e) \[ x|x + 5| \geq -6 \]

(f) \[ 70 + 90e^{-0.1t} \leq 75 \]

(g) \[ \frac{x^4 - 4x^3 + x^2 - 2x - 15}{x^3 - 4x^2} \geq x \]

37. How much money needs to be invested now to obtain $2000 in 3 years if the interest rate in a savings account is 0.25%, compounded continuously?

38. The temperature \( T \), in degrees Fahrenheit, \( t \) hours after 6 AM is given by:

\[ T(t) = -\frac{1}{2}t^2 + 8t + 32, \quad 0 \leq t \leq 12 \]

(a) What is the warmest temperature of the day?

(b) When does this happen?

39. Working together, Daniel and Donnie can clean the llama pen in 45 minutes. On his own, Daniel can clean the pen in an hour. How long does it take Donnie to clean the llama pen on his own?
40. $1000 is invested in an account which offers 1.25%, compounded monthly. Determine how long will it take for the initial investment to double.

41. Skippy wishes to plant a vegetable garden along one side of his house. In his garage, he found 32 linear feet of fencing. Since one side of the garden will border the house, Skippy doesn’t need fencing along that side.
   (a) What are the dimensions of the garden which will maximize the area of the garden?
   (b) What is the maximum area of the garden?

42. (a) Determine whether or not the relation represents $y$ as a function of $x$.
    (b) Find the domain and range if this relation is a function. *Use interval notation.*

43. Use the graph of $f(x)$ to answer the following
   (a) Find the zeros of $f$.
   (b) Does $f$ appear to be even, odd, or neither?
   (c) List the intervals where $f$ is increasing.
   (d) List the local maximums, if any exist
   (e) List the local minimums, if any exist
   (f) Find the maximum, if it exists
   (g) Find the minimum, if it exists