For problems 1-3, multiply, divide, add, or subtract, and simplify the given rational expressions. Leave in factored form, some may simplify to polynomials.

1. \[
\frac{(x - 1)(x + 2)}{x + 3} \cdot \frac{x + 3}{x + 2}
\]
2. \[
\frac{x^2 + 2x + 1}{x + 3} \div \frac{x^2 - 1}{x^2 + 4x + 3}
\]
3. \[
\frac{x^2 + 1}{x^2 - 1} + \frac{2x}{x^4 - 1}
\]

For problems 4-5, do the addition/subtraction, and then simplify.

4. \[
\frac{1}{x^2 - 1} - \frac{3x}{x^2 + x - 2}
\]
5. \[
\frac{x - 2}{x^2 - 2x - 3} + \frac{3}{x^2 - x - 2}
\]

For problems 6-7, solve the equation involving rational expressions by multiplying by the least common denominator.

6. \[
\frac{3}{x + 1} + \frac{1}{x - 1} = \frac{x + 10}{x^2 - 1}
\]
7. \[
\frac{2}{x - 2} + \frac{1}{x + 1} = \frac{x - 4}{x^2 - x - 2}
\]

For problems 8-10, write as a number without the radicals.

8. \(-\sqrt{16}\)
9. \sqrt{8}\]
10. \sqrt{-8}\]

Enter the following into your calculator, and round correctly to four decimal places.

11. \sqrt{2401}.\]

Simplify problems 12 and 13, and express your answers using whole numbers or fractions (and not decimals).

12. \sqrt{16x^2}.\]
13. \sqrt[5]{\frac{x^6}{8}}.\]
14. Simplify \sqrt[4]{4x + 4}\]

For problems 15-16, find all solution to the given equation. No solutions, is a possible answer.

15. \sqrt{x - 3} = 5\]
16. \( \sqrt{3x-2} + 1 = 3 \)

For problems 17-18, find both (real or complex) solutions to the quadratic equation.

17. \( x^2 = -16 \)

18. \( x^2 - 25 = 0 \)

For problems 19-20, complete the square. That is, write the equation in the form \( (x + a)^2 = d \) or \( (x - a)^2 = d \).

19. \( x^2 + 6x - 2 = 0 \)

20. \( x^2 - 10x + 15 = 0 \)

For problem 21, find both solutions to the quadratic equation. Write your answers like \( x = 1, -3 \), if the numbers come out nicely. Otherwise, your answers will look like \( x = 2 \pm \sqrt{5} \).

21. \( x^2 + 4x - 5 = 0 \)

Put the equation in the form \( (x - A)^2 = B \) or \( (x + A)^2 = B \). You’ll want to divide by the \( x^2 \)-coefficient first.

22. \( 2x^2 + 8x - 4 = 0 \)

For problems 23-24, solve the quadratic equation using any technique you wish (I suggest using the quadratic formula). Simplify your solution, and then convert your solutions to decimal numbers rounded to four decimal places (if needed).

23. \( 2x^2 - 3x + 1 = 0 \)

24. \( 3x^2 + 4x - 2 = 0 \)

Compute the appropriate function value for the function \( f(x) = 3^x \). Express your answer as a number in decimal form. Round to four decimal places if needed.

25. \( f(-1.3) \)

For problems 26-27, compute the value of the log. Express your answer as a number in decimal form. Round to four decimal places, if needed.

26. \( \log_3(5) \)

27. \( \log_6(23) \)

For problems 28-31, solve for \( x \), and convert your answer to decimal form rounded to four decimal places.

28. \( 2^{x-4} = 25 \)

29. \( e^{2x+1} = 125 \)

30. \( \log_7(x + 2) = 1.7 \)

31. \( \ln(x - 7) = 4 \)

Answers on next page.
1) \( x - 1 \).
2) \( \frac{(x+1)^2}{x-1} \).
3) \( \frac{x+1}{x-1} \).
4) \( \frac{-3x^2-2x+2}{(x+1)(x-1)(x+2)} \).
5) \( \frac{x^2-x-5}{(x+1)(x-3)(x-2)} \).
6) \( x = 4 \).
7) \( x = -2 \).
8) \(-2\).
9) \( 2 \).
10) \(-2\).
11) \( 7 \).
12) \( 4x \).
13) \( \frac{x^2}{2} \).
14) \( 2\sqrt{x+1} \).
15) \( x = 28 \).
16) \( x = 2 \).
17) \( x = \pm 4i \).
18) \( x = \pm 5 \).
19) \( (x+3)^2 = 11 \).
20) \( (x-5)^2 = 10 \).
21) \( (x+2)^2 = 9 \), so \( x = -2 \pm 3 = 1, -5 \).
22) \( (x+2)^2 = 6 \).
23) \( x = \frac{3+1}{4} = 1, \frac{1}{2} = 1, 0.5 \).
24) \( x = \frac{-4+\sqrt{36}}{6} = 0.3874, -1.7208 \). Can also be simplified to \( x = \frac{-2+\sqrt{10}}{3} \).
25) \( 0.2397 \).
26) \( 1.4650 \).
27) \( 1.7500 \).
28) \( x = 8.6439 \).
29) \( x = 1.9142 \).
30) \( x = 25.3317 \).
31) \( x = 61.5982 \).