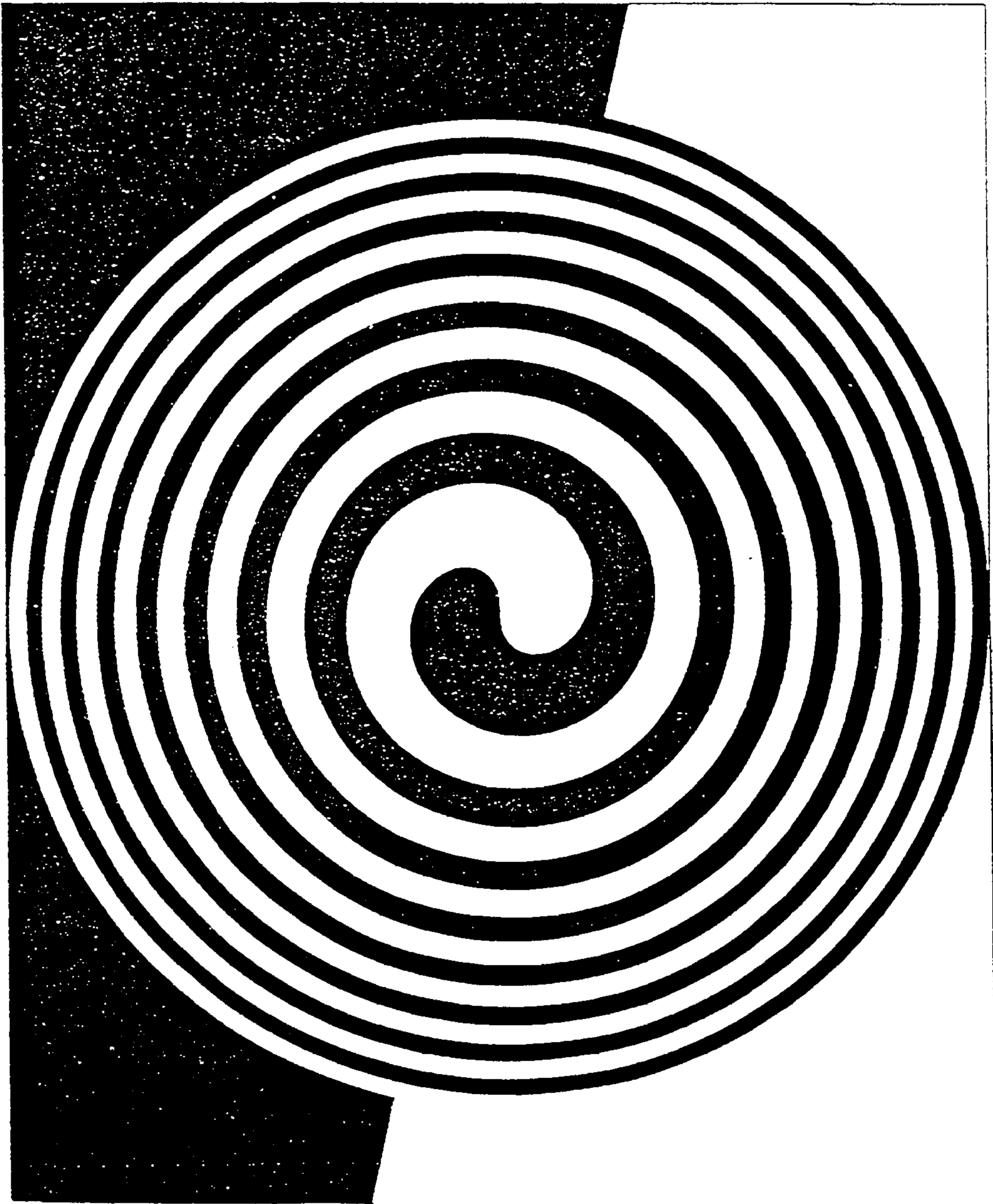


Pre-Calculus Algebra

MTH 1112

Practice Test 1



Practice Test 1

This practice test will cover:

- * Factoring (Review)
- * Rational Expressions (Reduce, Add, Subtract, Multiply, Divide)
- * Complex Fractions
- * Rational Exponents
- * Radicals
- * Complex Numbers

Factoring: A Review

(1) Completely factor.

$$6X^3 - 8X^2 - 10X$$

(2) Completely factor.

$$-8Y^7Z^2 + 24Y^9Z^5$$

(3) Completely factor.

$$-20S^3T^2 + 30S^2T^2 + 10ST$$

(4) Completely factor.

$$18A^5B^2 - 10A^4B + 4A^2B^3 + 2AB$$

(5) Completely factor.

$$K(X - Y) + 3(X - Y)$$

(6) Completely factor.

$$X^2 + X - 72$$

(7) Completely factor.

$$a^2 - 2a - 63$$

(8) Completely factor.

$$N^2 - 10N - 48$$

(9) Completely factor.

$$P^2 - P - 2$$

(10) Completely factor.

$$Z^2 - 14Z + 49$$

(11) Completely factor.

$$X^2 - 3XY + 2Y^2$$

(12) Completely factor.

$$A^2 + 2AB - 15B^2$$

(13) Completely factor.

$$R^2 + 18RS + S^2$$

(14) Completely factor.

$$3S^5 - 18S^4 + 15S^3$$

(15) Completely factor.

$$3MX^2 + 15MX + 18M$$

(16) Completely factor.

$$(X + Y)^2 - (X + Y)$$

(17) Completely factor.

$$2Y^2 + 5Y + 2$$

(18) Completely factor.

$$11B^2 - 9B - 2$$

(19) Completely factor.

$$8Y^2 + 47Y - 6$$

(20) Completely factor.

$$2S^2 + S - 6$$

(21) Completely factor.

$$R^2 - 64$$

(22) Completely factor.

$$50 - 2T^2$$

(23) Completely factor.

$$5Y^3 - 5Y$$

(24) Completely factor.

$$Y^4 - 16$$

(25) Completely factor.

$$X^4 - Y^4$$

(26) Completely factor.

$$Y^2 + 9$$

(27) Completely factor.

$$3B^2 + 30B + 75$$

(28) Completely factor.

$$X^3 + 7X^2 - X - 7$$

(29) Completely factor.

$$XY + 2X + CY + 2C$$

(30) Completely factor.

$$3ABCD - 3CD - AB + 1$$

(31) Completely factor.

$$5Y(2X - 1) - (2X - 1)$$

(32) Completely factor.

$$Y^3 + 1$$

(33) Completely factor.

$$Y^3 - 27$$

(34) Completely factor.

$$B^3 + 125$$

(35) Completely factor.

$$64P^3 - Q^3$$

(36) Completely factor.

$$3A^3 - 24B^3$$

(37) Completely factor.

$$(X - 3)^2 - (X + 4)^2$$

(38) Completely factor.

$$X^4 - 16$$

(39) Completely factor.

$$X^6 - 64$$

(40) Completely factor.

$$8 - 8M^2$$

(41) Completely factor.

$$(X - 1)^2 - 4$$

(42) Completely factor.

$$9X^4 - 144$$

Rational Expressions

- (43) Give the restrictions on the variable.

$$\frac{X + 2}{X - 3}$$

- (44) Give the restrictions on the variable.

$$\frac{X - 6}{2X - 9}$$

- (45) Give the restrictions on the variable.

$$\frac{2}{X^2 - 1}$$

- (46) Give the restrictions on the variable.

$$\frac{X - 9}{X^2 + 100}$$

- (47) Write the expression in lowest terms..

$$\frac{X^2 + 4X - 12}{3X - 6}$$

- (48) Write the expression in lowest terms.

$$\frac{X^3 - 4X}{X^2 + X - 2}$$

- (49) Write the expression in lowest terms.

$$\frac{9X^2 - 100}{3X + 10}$$

- (50) Write the expression in lowest terms.

$$\frac{10X - 20}{2 - X}$$

- (51) Write the expression in lowest terms.

$$\frac{3X^2 - 14X - 5}{6X^2 - 19X - 7}$$

- (52) Find the product. Leave your answer in simplest form.

$$\frac{2X^2 + X - 6}{X^2 + 4X - 5} \cdot \frac{X^3 - 3X^2 + 2X}{4X^2 - 6X}$$

- (53) Find the product. Leave your answer in simplest form.

$$\frac{3}{X} \cdot \frac{X^2}{12}$$

- (54) Find the product. Leave your answer in simplest form.

$$\left(\frac{-8Y^2}{27X}\right) \left(\frac{-45X}{49Y}\right)$$

- (55) Find the product. Leave your answer in simplest form.

$$\frac{-4A}{3CY} \cdot \frac{5XY^2}{6AC^2} \cdot \frac{9C^3}{10XY}$$

- (56) Find the product. Leave your answer in simplest form.

$$\frac{-2(X - Y)^2}{(X + Y)^3} \cdot \frac{(Y + X)^2}{(Y - X)} \cdot \frac{(X + Y)}{(X - Y)}$$

- (57) Find the quotient. Leave your answer in simplest form.

$$\frac{-18S}{10T} \div \frac{6S^3}{5T^2}$$

- (58) Find the quotient. Leave your answer in simplest form.

$$\frac{X^2 - X - 20}{X^2 - 12X + 35} \div \frac{X^2 + X - 12}{X^2 - 10X + 21}$$

- (59) Find the quotient. Leave your answer in simplest form.

$$\frac{4X - 20}{5 - X}$$

- (60) Perform the indicated operations. Leave your answer in simplest form.

$$\left(\frac{3a^2}{8b^3} \cdot \frac{-5b}{6a}\right) \div \left(\frac{-8b}{9a} \cdot \frac{4a^3}{3b^2}\right)$$

- (61) Perform the addition.

$$\frac{1}{a} + \frac{a+2}{a+1}$$

- (62) Perform the addition. Leave your answer in simplest form

$$\frac{5}{p^2 + 17p + 16} + \frac{3}{p^2 + 9p + 8}$$

- (63) Perform the addition. Leave your answer in simplest form.

$$\frac{3X + 1}{X^2 + 2X + 1} + \frac{X - 4}{X^2 + 3X + 2}$$

- (64) Perform the addition. Leave your answer in simplest form.

$$\frac{7}{X+9} + \frac{X+2}{X+9}$$

- (65) Perform the subtraction. Leave your answer in simplest form.

$$\frac{-14}{3a-5} - \frac{6a-24}{3a-5}$$

- (66) Perform the subtraction. Leave your answer in simplest form.

$$\frac{5}{X-2} - \frac{2}{2X-4}$$

- (67) Perform the subtraction. Leave your answer in simplest form.

$$\frac{-1}{Y-3} - \frac{2}{3-Y}$$

- (68) Perform the subtraction. Leave your answer in simplest form.

$$\frac{1}{X^2-1} - \frac{1}{X^2-2X+1}$$

- (69) Perform the subtraction. Leave your answer in simplest form.

$$\frac{4N+3}{N+2} - \frac{2N-5}{N^2-2N-8}$$

- (70) Perform the indicated operation. Leave your answer in simplest form.

$$\frac{N+1}{N-1} - 1$$

- (71) Perform the indicated operations. Leave your answer in simplest form.

$$\frac{2p}{p^2-9} + \frac{2}{p+3} - \frac{1}{p-3}$$

Complex Fractions

(72) Perform the indicated operation(s).

$$\frac{\frac{5}{X}}{\frac{3}{X^2}}$$

(73) Perform the indicated operation(s).

$$\frac{\frac{56}{XY}}{\frac{49}{X^2}}$$

(74) Perform the indicated operation(s).

$$\frac{\frac{1}{X} - 5}{\frac{1}{X} + 3}$$

(75) Perform the indicated operation(s).

$$\frac{\frac{m+n}{m}}{\frac{1}{m} + \frac{1}{n}}$$

(76) Perform the indicated operation(s).

$$\frac{X - 1}{X - \frac{1}{X}}$$

(77) Perform the indicated operation(s).

$$\frac{\frac{1}{X} - \frac{1}{Y}}{\frac{X-Y}{3}}$$

(78) Perform the indicated operation(s).

$$\frac{a - 3 + \frac{2}{a}}{a - 4 + \frac{3}{a}}$$

(79) Perform the indicated operation(s).

$$\frac{1 + \frac{X}{Y-X}}{\frac{X}{X+Y} - 1}$$

Rational Exponents

In these rational exponent problems assume that all variables represent positive real numbers and that variables used as exponents represent rational numbers. Write your answers using only positive exponents.

(80) Evaluate.

$$-5^2$$

(81) Evaluate.

$$(-5)^2$$

(82) Evaluate.

$$27^{\frac{1}{3}}$$

(83) Evaluate.

$$\left(\frac{16}{81}\right)^{-\frac{3}{4}}$$

(84) Evaluate.

$$\left(-\frac{1}{64}\right)^{-\frac{1}{3}}$$

(85) Evaluate.

$$100^{-\frac{3}{2}}$$

(86) Evaluate.

$$36^{\frac{3}{2}}$$

(87) Perform the indicated operations.

$$5^{\frac{2}{3}} \cdot 5^{-\frac{5}{3}}$$

(88) Perform the indicated operations.

$$(3a^{\frac{1}{2}})(-2a^{\frac{5}{2}})$$

(89) Perform the indicated operations.

$$(XY^{-\frac{2}{3}})^3 (X^{\frac{1}{2}}Y)^2$$

(90) Perform the indicated operations.

$$(M^{\frac{2}{3}})^5 (M^9)^{-\frac{1}{2}} (M^{\frac{1}{12}})^{14}$$

(91) Perform the indicated operations.

$$\frac{2^{-\frac{1}{2}}c^{\frac{2}{3}}}{2^{\frac{5}{4}}c^{-\frac{1}{6}}}$$

(92) Perform the indicated operations.

$$\frac{3^{\frac{1}{2}}x^{-\frac{5}{4}}y}{3^{-\frac{1}{2}}x^{\frac{1}{6}}y^{\frac{3}{2}}}$$

(93) Perform the indicated operations.

$$\frac{(x^{\frac{1}{2}})^{\frac{1}{4}} y^{\frac{1}{2}} y^2}{(x^{\frac{1}{16}})^2 (y^2)^{\frac{5}{4}}}$$

(94) Perform the indicated operations.

$$\frac{2 \cdot 2^{\frac{1}{2}} \cdot (2^{\frac{1}{4}})^2}{2^4 \cdot 2^{\frac{1}{3}} \cdot (2^{\frac{1}{8}})^3}$$

Radicals

(95) Rewrite the rational exponent expressions as an equivalent radical expressions.

(a) $4m^{\frac{1}{5}}$ (b) $(4m)^{\frac{1}{5}}$ (c) $(4m)^{-\frac{1}{5}}$ (d) $4m^{-\frac{1}{5}}$

(96) Rewrite the radical expressions as equivalent rational exponent expressions.

(a) $7\sqrt[3]{k}$ (b) $\sqrt[3]{7k}$ (c) $-\sqrt[3]{7k}$ (d) $-7\sqrt[3]{k}$

(97) Simplify the radical expressions below. Assume that all variables represent positive real numbers.

(a) $\sqrt[3]{64}$

(b) $-\sqrt{9}$

(c) $\sqrt[3]{-1}$

(d) $\sqrt{-25}$

(e) $\sqrt[3]{\frac{1}{8}}$

(f) $\sqrt{\frac{16}{25}}$

(g) $\sqrt[4]{-16}$

(h) $\sqrt[4]{\frac{1}{16}}$

(i) $\sqrt[4]{24}$

(j) $\sqrt[3]{(-5)^3}$

(k) $\sqrt{-6^2}$

(l) $\sqrt{X^{12}}$

(m) $\sqrt[3]{X^6}$

(n) $\sqrt[4]{(-3)^4}$

(98) Simplify.

$$\sqrt{4X^2Y^2}$$

(99) Simplify.

$$\sqrt{50X^5Y^8Z}$$

(100) Simplify.

$$\sqrt[3]{32a^4b^6c^2d^{20}}$$

(101) Simplify.

$$\sqrt[5]{-243m^{10}n^{17}p^3}$$

(102) Simplify.

$$\sqrt[3]{(X-9)^3}$$

(103) Simplify.

$$\sqrt{X^2+7^2}$$

(104) Simplify.

$$\sqrt{y} \cdot \sqrt{y^3}$$

(105) Simplify.

$$\sqrt{\frac{54X^3Y^7}{6XY^2}}$$

(106) Simplify.

$$\sqrt[3]{\frac{162X^4Y^5}{3XY^2}}$$

(107) Simplify.

$$\sqrt{\frac{1}{5}}$$

(108) Simplify.

$$\sqrt{\frac{3}{X}}$$

(109) Simplify.

$$\sqrt[5]{\frac{1}{XY^3}}$$

(110) Simplify.

$$\sqrt{\frac{a^2b^3}{3c}}$$

(111) Simplify.

$$\frac{\sqrt[3]{8m^2n^3} \cdot \sqrt[3]{2m^2}}{\sqrt[3]{32m^4n^3}}$$

(112) Simplify.

$$\frac{\sqrt[4]{rs^2t^3} \cdot \sqrt[4]{r^3s^2t}}{\sqrt[4]{r^2t^3}}$$

(113) Simplify.

$$2\sqrt[3]{3} + 4\sqrt[3]{24} - \sqrt[3]{81}$$

(114) Simplify.

$$\frac{5}{\sqrt[3]{2}} - \frac{2}{\sqrt[3]{16}} + \frac{1}{\sqrt[3]{54}}$$

(115) Simplify.

$$(\sqrt{2} - 1)^2$$

(116) Simplify.

$$(3\sqrt{2} + \sqrt{3})(2\sqrt{3} - \sqrt{2})$$

Rationalize the denominator of the following radical expressions. Assume that all variables represent non-negative numbers and that no denominators are zero.

(117) Rationalize the denominator.

$$\frac{\sqrt{7}}{\sqrt{3} - \sqrt{7}}$$

(118) Rationalize the denominator.

$$\frac{\sqrt{p}}{1 - \sqrt{p}}$$

(119) Rationalize the denominator.

$$\frac{2\sqrt{5} + 3}{2\sqrt{5} - 3}$$

Complex Numbers

(120) Write without a negative radicand.

$$\sqrt{-400}$$

(121) Multiply. (Hint: Use the definition $\sqrt{-a} = i\sqrt{a}$ before multiplying. Leave your answer in standard form.

$$\sqrt{-5} \cdot \sqrt{-5}$$

(122) Multiply. Leave your answer in standard form.

$$\sqrt{-3} \cdot \sqrt{-12}$$

(123) Multiply. Leave your answer in standard form.

$$(-1 + \sqrt{-3})^2$$

(124) Add. Leave your answer in standard form.

$$(3 - i) + (2 + 3i)$$

(125) Add. Leave your answer in standard form.

$$2i + (-4 - 2i)$$

- (126) Perform the indicated operations. Leave your answer in standard form.

$$3 - (-2 + 3i) + (-5 + i)$$

- (127) Multiply. Leave your answer in standard form.

$$(i)(-3i)$$

- (128) Multiply. Leave your answer in standard form.

$$(2 - i)(4 + 3i)$$

- (129) Multiply. Leave your answer in standard form.

$$(3 + 2i)(3 - 2i)$$

- (130) Divide. Leave your answer in standard form.

$$\frac{8 + 20i}{2i}$$

- (131) Divide. Leave your answer in standard form.

$$\frac{2 + 3i}{4 - 2i}$$

- (132) Divide. Leave your answer in standard form.

$$\frac{3}{1 - i}$$

- (133) Divide. Leave your answer in standard form.

$$\frac{8 - 7i}{1 - 2i}$$

(134) Divide. Leave your answer in standard form.

$$\frac{-2 + i}{2 - i}$$

(135) Divide. Leave your answer in standard form.

$$\frac{2}{i}$$

(136) Evaluate.

$$i^{40}$$

(137) Evaluate.

$$i^{50}$$

(138) Evaluate.

$$i^{25}$$

(139) Evaluate.

$$i^{67}$$

(140) Evaluate.

$$i^{-30}$$

(141) Evaluate.

$$i^{-11}$$

Answers

(1) $2X(3X^2 - 4X - 5)$

(2) $-8Y^7Z^2(1 - 3Y^2Z^3)$

(3) $-10ST(2S^2T - 3ST - 1)$

(4) $2AB(9A^4B - 5A^3 + 2AB^2 + 1)$

(5) $(X - Y)(K + 3)$

(6) $(X + 9)(X - 8)$

(7) $(a - 9)(a + 7)$

(8) *prime*

(9) $(P - 2)(P + 1)$

(10) $(Z - 7)^2$

(11) $(X - 2Y)(X - Y)$

(12) $(A + 5B)(A - 3B)$

(13) *prime*

(14) $3S^3(S - 5)(S - 1)$

(15) $3M(X + 3)(X + 2)$

(16) $(X + Y)(X + Y - 1)$

(17) $(2Y + 1)(Y + 2)$

(18) $(11B + 2)(B - 1)$

(19) $(8Y - 1)(Y + 6)$

(20) $(2S - 3)(S + 2)$

(21) $(R - 8)(R + 8)$

(22) $2(5 + T)(5 - T)$

(23) $5Y(Y - 1)(Y + 1)$

(24) $(Y^2 + 4)(Y + 2)(Y - 2)$

(25) $(X^2 + Y^2)(X - Y)(X + Y)$

(26) *prime*

(27) $3(B + 5)^2$

(28) $(X + 7)(X + 1)(X - 1)$

(29) $(Y + 2)(X + C)$

(30) $(AB - 1)(3CD - 1)$

(31) $(2X - 1)(5Y - 1)$

(32) $(Y + 1)(Y^2 - Y + 1)$

- | | |
|---|---|
| (33) $(Y - 3)(Y^2 + 3Y + 9)$ | (48) $\frac{X(X-2)}{X-1}$ |
| (34) $(B + 5)(B^2 - 5B + 25)$ | (49) $3X - 10$ |
| (35) $(4P - Q)(16P^2 + 4PQ + Q^2)$ | (50) -10 |
| (36) $3(A - 2B)(A^2 + 2AB + 4B^2)$ | (51) $\frac{X-5}{2X-7}$ |
| (37) $-7(2X + 1)$ | (52) $\frac{(X+2)(X-2)}{2(X+5)}$ |
| (38) $(X - 2)(X + 2)(X^2 + 4)$ | (53) $\frac{X}{4}$ |
| (39) $(X - 2)(X^2 + 2X + 4)(X + 2)(X^2 - 2X + 4)$ | (54) $\frac{40Y}{147}$ |
| (40) $8(1 + M)(1 - M)$ | (55) -1 |
| (41) $(X + 1)(X - 3)$ | (56) 2 |
| (42) $9(X^2 + 4)(X - 2)(X + 2)$ | (57) $-\frac{37}{25^2}$ |
| (43) $X \neq 3$ | (58) 1 |
| (44) $X \neq \frac{9}{2}$ | (59) -4 |
| (45) $X \neq 1$ and $X \neq -1$ | (60) $\frac{135}{512ab}$ |
| (46) <i>no restrictions</i> | (61) $\frac{a^2+3a+1}{a(a+1)}$ |
| (47) $\frac{X+6}{3}$ | (62) $\frac{8(p+11)}{(p+16)(p+8)(p+1)}$ |

$$(63) \frac{2(2X^2+2X-1)}{(X+1)^2(X+2)}$$

$$(64) 1$$

$$(65) -2$$

$$(66) \frac{4}{X-2}$$

$$(67) \frac{1}{Y-3}$$

$$(68) \frac{-2}{(X+1)(X-1)^2}$$

$$(69) \frac{4N^2-15N-7}{(N+2)(N-4)}$$

$$(70) \frac{2}{N-1}$$

$$(71) \frac{3}{p+3}$$

$$(72) \frac{5X}{3}$$

$$(73) \frac{8X}{7Y}$$

$$(74) \frac{1-5X}{1+3X}$$

$$(75) n$$

$$(76) \frac{X}{X+1}$$

$$(77) \frac{-3}{XY}$$

$$(78) \frac{a-2}{a-3}$$

$$(79) \frac{X+Y}{X-Y}$$

$$(80) -25$$

$$(81) 25$$

$$(82) 3$$

$$(83) \frac{27}{8}$$

$$(84) -4$$

$$(85) \frac{1}{1000}$$

$$(86) 216$$

$$(87) \frac{1}{5}$$

$$(88) -6a^2$$

$$(89) X^4$$

$$(90) 1$$

$$(91) \frac{c^{\frac{5}{2}}}{2^{\frac{5}{2}}}$$

$$(92) \frac{3}{x^{12}y^{\frac{1}{2}}}$$

$$(93) 1$$

$$(94) \frac{1}{2^{\frac{17}{6}}}$$

- (95) (a) $4\sqrt[5]{m}$ (b) $\sqrt[5]{4m}$ (100) $2ab^2d^6\sqrt[3]{4ac^2d^2}$
- (c) $\frac{1}{\sqrt[5]{4m}}$ (d) $\frac{4}{\sqrt[5]{m}}$ (101) $-3m^2n^3\sqrt[5]{n^2p^3}$
- (96) (a) $7k^{\frac{1}{3}}$ (b) $(7k)^{\frac{1}{3}}$ (102) $(X - 9)$
- (c) $-(7k)^{\frac{1}{3}}$ (d) $-7k^{\frac{1}{3}}$ (103) cannot be simplified
- (97) (a) 4 (b) -3 (104) Y^2
- (c) -1 (105) $3XY^2\sqrt{Y}$
- (d) *no real solution* (106) $3XY\sqrt[3]{2}$
- (e) $\frac{1}{2}$ (f) $\frac{4}{5}$ (107) $\frac{\sqrt{5}}{5}$
- (g) *no real solution* (108) $\frac{\sqrt{3X}}{X}$
- (h) $\frac{1}{2}$ (i) 2 (109) $\frac{\sqrt[5]{X^4Y^2}}{XY}$
- (j) -5 (110) $\frac{\sqrt[4]{27a^2b^3c^3}}{3c}$
- (k) *no real solution* (111) $\frac{\sqrt[3]{4}}{2}$
- (l) X^6 (m) X^2 (112) $s\sqrt[4]{r^2t}$
- (n) 3 (113) $7\sqrt[3]{3}$
- (98) $2XY$ (114) $\frac{13\sqrt[3]{4}}{6}$
- (99) $5X^2Y^4\sqrt{2XZ}$ (115) $-2\sqrt{2} + 3$

- | | | | |
|-------|-------------------------------|-------|-------------------------------|
| (116) | $5\sqrt{6}$ | (132) | $\frac{3}{2} + \frac{3}{2}i$ |
| (117) | $\frac{\sqrt{21}+7}{-4}$ | (133) | $\frac{22}{5} + \frac{9}{5}i$ |
| (118) | $\frac{\sqrt{p+p}}{1-p}$ | (134) | -1 |
| (119) | $\frac{29+12\sqrt{5}}{11}$ | (135) | $-2i$ |
| (120) | $0 + 20i$ | (136) | 1 |
| (121) | $-5 + 0i$ | (137) | -1 |
| (122) | $-6 + 0i$ | (138) | i |
| (123) | $-2 - 2i\sqrt{3}$ | (139) | $-i$ |
| (124) | $5 + 2i$ | (140) | -1 |
| (125) | $-4 + 0i$ | (141) | i |
| (126) | $0 - 2i$ | | |
| (127) | $3 + 0i$ | | |
| (128) | $11 + 2i$ | | |
| (129) | $13 + 0i$ | | |
| (130) | $10 - 4i$ | | |
| (131) | $\frac{1}{10} + \frac{4}{5}i$ | | |