

Name: \_\_\_\_\_

This assignment is worth 100 points. You will be awarded 40 points for attempting the entire assignment (that is answer all problems). I will then select 30 problems at random to grade, each worth 2 points each. The space left between each question is indicative of how much work you should show. If there are any problems you find particularly difficult, circle them in red. If there are any particular questions you would like feedback on, circle them in green. These are examples of questions that might appear on an exam/quiz. If you use a calculator to help, make sure you can also do them without it.

1. Given the sets below, find the indicated set. Remember  $\{a, b\}$  denotes the set containing  $a$  and  $b$ , and  $(a, b)$  denotes the interval from  $a$  to  $b$ .

(a)  $A = \{1, 2, 5, 7, 8, 9\}$ ,  $A \cup B =$   
 $B = \{2, 3, 4, 8, 9, 10\}$ .

Answer: \_\_\_\_\_

(b)  $S = \{2, 4, 6, 8, 10, 12\}$ ,  $S \cap T \cap U =$   
 $T = \{3, 6, 9, 12, 15\}$ ,  
 $U = \{2, 3, 6, 8, 9, 12\}$ .

Answer: \_\_\_\_\_

(c)  $X = \{1, 2, 3, 5, 8, 13\}$ ,  $X \cap Y =$   
 $Y = (2, 9)$ .

Answer: \_\_\_\_\_

(d)  $M = (-2, 6]$ ,  $M \cup N =$   
 $N = [-1, 6]$ .

Answer: \_\_\_\_\_

2. For each of the sets  $A$  and  $B$ , find a point that lies in one set, but not the other. State which set the point you choose belongs to.

(a)  $A = (2, 5)$ ,  
 $B = [3, 4]$ .

Answer: \_\_\_\_\_

(b)  $A = [-7, 3)$ ,  
 $B = (-7, 3]$ .

Answer: \_\_\_\_\_

(c)  $A = [0, 17)$ ,  
 $B = (-1, 15)$ .

Answer: \_\_\_\_\_

(d)  $A = (8, 10]$ ,  
 $B = (8, 9.9]$ .

Answer: \_\_\_\_\_

3. Calculate the given expression. Your answer should be a single number with no exponents or radicals.

(a)  $64^{\frac{1}{2}}$

Answer: \_\_\_\_\_

(i)  $(-243)^{\frac{1}{5}}$

Answer: \_\_\_\_\_

(b)  $16^{\frac{1}{2}}$

Answer: \_\_\_\_\_

(j)  $\sqrt{256}$

Answer: \_\_\_\_\_

(c)  $16^{\frac{1}{4}}$

Answer: \_\_\_\_\_

(k)  $\sqrt[4]{256}$

Answer: \_\_\_\_\_

(d)  $121^{-\frac{1}{2}}$

Answer: \_\_\_\_\_

(l)  $\sqrt[8]{256}$

Answer: \_\_\_\_\_

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

Answer: \_\_\_\_\_

(m)  $\sqrt[5]{-1024}$

Answer: \_\_\_\_\_

(f)  $(-\frac{27}{8})^{\frac{1}{3}}$

Answer: \_\_\_\_\_

(n)  $\sqrt[3]{-216}$

Answer: \_\_\_\_\_

(g)  $49^{\frac{3}{2}}$

Answer: \_\_\_\_\_

(o)  $\sqrt[3]{343}$

Answer: \_\_\_\_\_

(h)  $64^{-\frac{5}{6}}$

Answer: \_\_\_\_\_

4. Simplify the given expression so that the only exponents that appear are positive.

(a)  $(3x^{-2}y^{-4})^{-1}$

Answer: \_\_\_\_\_

(b)  $[(2a^2)^{-3}b^4]^{-3}$

Answer: \_\_\_\_\_

(c)  $\frac{c^{-6}b^{10}}{b^9c^{-11}}$

Answer: \_\_\_\_\_

$$(d) \frac{4a^3 (b^2a)^{-4}}{c^{-6}a^2b^{-7}}$$

Answer: \_\_\_\_\_

$$(e) \frac{(6v^2)^{-1} x^{-4}}{(2v)^{-3} w^{10}}$$

Answer: \_\_\_\_\_

$$(f) \left[ \frac{(8x^{21})^0 y^{-3} x^8}{y^{-9} x^{-1}} \right]^6$$

Answer: \_\_\_\_\_

$$(g) \left( \frac{a^2 b^{-4} c^{-1}}{b^{-9} c^8 a^{-4}} \right)^{-2}$$

Answer: \_\_\_\_\_

$$(h) \left[ \frac{p^{-6} q^7 (p^2 q)^{-3}}{(p^{-1} q^{-4})^2 p^{10}} \right]$$

Answer: \_\_\_\_\_

5. Simplify the given expression so that the only exponents that appear are positive.

$$(a) (p^{-2} q^{-4})^{\frac{3}{2}}$$

Answer: \_\_\_\_\_

$$(b) x^{\frac{3}{4}} (x^2 x^{-\frac{1}{3}})^{\frac{3}{2}}$$

Answer: \_\_\_\_\_

$$(c) a^{\frac{1}{2}} a^{-\frac{1}{3}} a^{\frac{1}{4}}$$

Answer: \_\_\_\_\_

(d)  $\left(m^{-\frac{7}{3}}n^{\frac{5}{4}}\right)^{-\frac{9}{8}}$

Answer: \_\_\_\_\_

(e)  $\left(\frac{a^{-\frac{1}{3}}b^2}{b^{\frac{2}{3}}a^{-\frac{3}{4}}}\right)^{\frac{1}{5}}$

Answer: \_\_\_\_\_

(f)  $\left(\frac{p^{\frac{1}{2}}q^{\frac{1}{3}}}{p^{-\frac{1}{3}}q^{-\frac{1}{4}}}\right)^{-3}$

Answer: \_\_\_\_\_

(g)  $\left(\frac{x^{\frac{3}{4}}y^{-\frac{2}{3}}}{x^{\frac{7}{4}}}\right)^{\frac{7}{8}}$

Answer: \_\_\_\_\_

(h)  $\left(\frac{b^3c^{-\frac{1}{4}}a^{-1}}{b^{\frac{1}{4}}a^{-\frac{2}{7}}c^{\frac{3}{2}}}\right)^{\frac{2}{3}}$

Answer: \_\_\_\_\_

6. Write the given expression in exponential form.

(a)  $\sqrt{3n}$

Answer: \_\_\_\_\_

(b)  $\sqrt[9]{2y}$

Answer: \_\_\_\_\_

(c)  $\sqrt[5]{7x^3}$

Answer: \_\_\_\_\_

(d)  $\sqrt[4]{xyz}$

Answer: \_\_\_\_\_

(e)  $\sqrt{x+y}$

Answer: \_\_\_\_\_

(f)  $\sqrt[3]{a^3 + b^3}$

Answer: \_\_\_\_\_

7. Convert the given expression to rational exponent form.

(a)  $\sqrt{z^5}$

Answer: \_\_\_\_\_

(b)  $\sqrt[3]{z^5}$

Answer: \_\_\_\_\_

(c)  $\sqrt[3]{16x^{17}}$

Answer: \_\_\_\_\_

(d)  $\sqrt[6]{128y^{11}}$

Answer: \_\_\_\_\_

(e)  $\sqrt{x^3y^{17}z^4}$

Answer: \_\_\_\_\_

(f)  $\sqrt[4]{x^3y^{20}z^5}$

Answer: \_\_\_\_\_

(g)  $\sqrt[4]{729x^7yz^{13}}$

Answer: \_\_\_\_\_

(h)  $\sqrt[3]{4x^2y}\sqrt[3]{10x^5y^2}$

Answer: \_\_\_\_\_

(i)  $\sqrt{3x}\sqrt{6x}\sqrt{14x}$

Answer: \_\_\_\_\_

(j)  $\sqrt[4]{2xy^3}\sqrt[4]{32x^2y^2}$

Answer: \_\_\_\_\_

8. Decide if the given statement is true or false. If false give the corrected version of the statement.

(a)  $\frac{1}{6x} = 6x^{-1}$

Answer: \_\_\_\_\_

(b)  $(x^3)^7 = x^{10}$

Answer: \_\_\_\_\_

(c)  $(m^3n^4)^2 = m^{12}n^8$

Answer: \_\_\_\_\_

(d)  $[(z^2)^3]^4 = z^{24}$

Answer: \_\_\_\_\_

$$(e) (x + y)^3 = x^3 + y^3$$

Answer: \_\_\_\_\_

$$(f) a^{-\frac{3}{2}} = a^{\frac{2}{3}}$$

Answer: \_\_\_\_\_

$$(g) x^{-n} = x^{\frac{1}{n}}$$

Answer: \_\_\_\_\_

$$(h) 3x^{\frac{1}{2}} = \sqrt{3x}$$

Answer: \_\_\_\_\_

$$(i) \sqrt[3]{x+6} = \sqrt[3]{x} + \sqrt[3]{6}$$

Answer: \_\_\_\_\_

$$(j) \sqrt[4]{x^2} = \sqrt{x}$$

Answer: \_\_\_\_\_

9. Expand and simplify the given expression.

$$(a) 3(3w + 3x) + 3(2w - 2x)$$

Answer: \_\_\_\_\_

$$(b) 4(6d + 2e) - 6(3d + 2e)$$

Answer: \_\_\_\_\_

$$(c) x(x + 2y - 3z) + 3z(a - 2y + 3z) - 2y(x - y - 3z)$$

Answer: \_\_\_\_\_

$$(d) 3a(2b - 3c + 4d) - 2b(3a - c + 6d)$$

Answer: \_\_\_\_\_

$$(e) 7(p + 2) - 3(2p - 3)$$

Answer: \_\_\_\_\_

$$(f) 6f(f + 2g - h)(h + 3g)$$

Answer: \_\_\_\_\_

$$(g) 5x + 6xy(z + 5y) + 5z(2x - 3y)(2x + 3y)$$

Answer: \_\_\_\_\_



10. Factorise the given expression completely.

(a)  $36b^2 - 25a^2$

Answer: \_\_\_\_\_

(b)  $2xy - 6x^2y + 4xy^3$

Answer: \_\_\_\_\_

(c)  $d^2 + 4e^2 - 4de$

Answer: \_\_\_\_\_

(d)  $u^2v^3 - 3uv + 7u^2v$

Answer: \_\_\_\_\_

(e)  $a^2 + 2ab + b^2$

Answer: \_\_\_\_\_

(f)  $xy(x + y)^2 + 4xy + 6x^2y$

Answer: \_\_\_\_\_