

Solutions

Practice Exam 1 Chapters A-D and 1

Simplify using exponent rules.

1. $\left(\frac{16x^{-2}y^6}{x^8y^{-4}}\right)^{-1/2}$

$$\left(\frac{16y^{10}}{x^{10}}\right)^{-1/2} = \frac{(16)^{-1/2} (y^{10})^{-1/2}}{(x^{10})^{-1/2}} = \frac{x^5}{4y^5}$$

2. $\sqrt[3]{4xy^2} \sqrt[3]{2x^5y}$

$$(4)^{1/3} x^{1/3} y^{2/3} \cdot 2^{1/3} x^{5/3} y^{1/3}$$
$$2 \cdot x^2 \cdot y$$

3. $\sqrt{x^2} \sqrt{x^3}$

$$\left(x^2 (x^3)^{1/2}\right)^{1/2} = \left(x^{7/2}\right)^{1/2} = x^{7/4}$$

Perform the indicated operation and simplify.

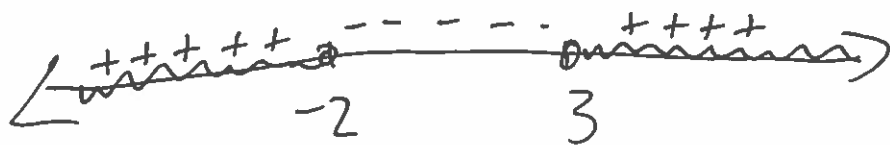
$$4. \frac{x^2 - 10x + 21}{2x^2 - 12x - 14} \div \frac{x^2 + 2x - 15}{2x^2 + 12x + 10} = \frac{(x-7)(x-3)}{2(x-7)(x+1)} \cdot \frac{2(x+5)(x+1)}{(x+5)(x-3)} = 1$$

$$\begin{aligned}
 5. \frac{3}{y^2+6y+8} - \frac{2}{y^2-4} &= \frac{3}{(y+4)(y+2)} - \frac{2}{(y+2)(y-2)} \\
 &= \frac{3(y-2) - 2(y+4)}{(y+4)(y+2)(y-2)} \\
 &= \frac{3y-6-2y-8}{(y+4)(y+2)(y-2)} = \frac{y-14}{(y+4)(y+2)(y-2)}.
 \end{aligned}$$

Solve the inequality. Write your solution in interval notation and graph it on the real number line.

$$6. x^2 - x - 6 > 0$$

$$(x-3)(x+2) > 0$$



$$(0-3)(0+2) < 0 \quad \text{so}$$

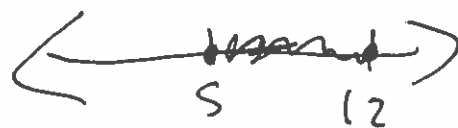
$$\text{Solutions } (-\infty, -2) \cup (3, \infty)$$

$$7. -14 \geq -4 - 2x > -28$$

$$-10 \geq -2x \geq -24$$

$$10 \leq 2x \leq 24$$

$$5 \leq x \leq 12 \quad \text{or } [5, 12].$$



Solve the quadratic equation by factoring.

8. $x^2 + x = 30$

$$x^2 + x - 30 = 0$$

$$(x+6)(x-5) = 0$$

$$x = -6, 5$$

Solve the quadratic equation by any method learned in class.

9. $x^2 + 7x + 1 = 0$

$$x = \frac{-7 \pm \sqrt{7^2 - 4 \cdot 1 \cdot 1}}{2 \cdot 1} = \frac{-7 \pm \sqrt{45}}{2}$$

$$x = \frac{-7 - \sqrt{45}}{2}, \frac{-7 + \sqrt{45}}{2}$$

Factor completely.

10. $y^2(x^2 - 4) - (x^2 - 4)$

$$(x^2 - 4)(y^2 - 1) = (x+2)(x-2)(y+1)(y-1)$$

11. $27p^3 - 1 = 27(p^3 - 1/27) = 27(p - 1/3)(p^2 + 1/3 p + 1/9)$

~~Factor~~

12. $3x^3 + 6x^2 - 2x - 4$ Factor by Grouping

$$3x^2(x+2) - 2(x+2) = (3x^2 - 2)(x+2)$$

13. $144x^2 + 49$

$$= (\sqrt{3}x - \sqrt{7})(\sqrt{3}x + \sqrt{7})(x+2)$$

Cannot be factored in real numbers.

14. Let $P(2, 1)$ and $Q(3, -2)$ be two points in the coordinate plane.

(a) Find the distance between the points P and Q .

$$d(P, Q) = \sqrt{(3-2)^2 + (-2-1)^2} = \sqrt{1+9} = \sqrt{10}$$

(b) Find the midpoint between the points P and Q .

$$\text{midpoint} = \left(\frac{2+3}{2}, \frac{1-2}{2} \right) = \left(\frac{5}{2}, -\frac{1}{2} \right)$$

15. A set of data is given in the following table. Find a linear equation to model the data. Use your model to predict the value of y when $x = 20$.

x	y
0	12
1	17
2	22
3	27
4	32

$$\text{slope} = \frac{5}{1} = 5$$

$$y\text{-intercept} = 12$$

$$y = 5x + 12 \quad \text{so when } x = 20,$$

$$y = 5 \cdot 20 + 12 = 112.$$

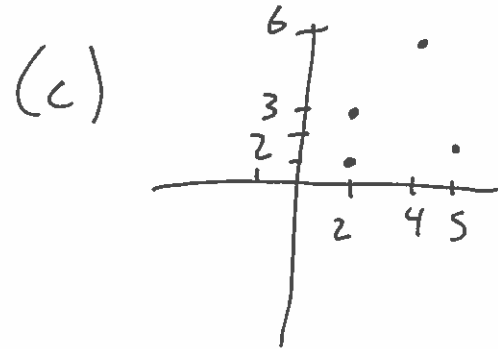
16. A set of ordered pairs defining a relation is given below.

$$\{(5, 2), (4, 6), (2, 3), (2, 1)\}$$

- (a) Find the domain of the relation.
- (b) Find the range of the relation.
- (c) Sketch a diagram of the relation.
- (d) Does the relation define a function?

(a) Domain = $\{5, 4, 2\}$

(b) Range = $\{2, 6, 3, 1\}$



(d) No because the input 2 has two outputs 3 and 1. Or it fails vertical line test.

17. Consider the function given by

Typo

$$r(z) = 8(z-4)^2$$

- (a) What is the name of the function?
- (b) What letter represents the input?
- (c) What is the output?
- (d) Find $r(3)$. What does it represent?
- (e) What is the domain of the function?

(a) r

(b) z

(c) $r(z)$ or $8(z-4)^2$

(d) $r(3) = 8(3-4)^2 = 8$

(e) $\text{Dom}(r) = \mathbb{R} = \text{all } \sqrt{\text{Page 5}} \text{ real numbers}$

18. When a skydiver jumps out of an airplane from a height of 13,000 ft, her height h above the ground after t seconds is given by the function

$$h(t) = 13,000 - 16t^2.$$

- (a) Find $h(10)$ and $h(20)$. What do these values represent?
(b) For safety reasons a sky diver must open the parachute at a height of about 2500 ft (or higher). A sky diver opens her parachute after 24 seconds. Did she open the parachute at a safe height?
(c) Find the net change in the sky diver's height from 0 to 25 seconds.

(a) $h(10) = 13,000 - 16(10)^2 = 11,400$ ft

$$h(20) = 13,000 - 16(20)^2 = 6,600$$
 ft

~~10~~ 10 (or 20) seconds after jumping, the sky diver is 11,400 (or 6,600) ft from the ground.

(b) $h(24) = 3,784$ ft. This is above 2500 ft

so this is a safe height.

(c) $h(25) - h(0) = 3000 - 13000 = -10,000$ ft.

She dropped 10,000 ft in the first 25 seconds.