1. Which of the following statements is (are) true?

I. $\frac{1}{y} \geq 10$ means "The reciprocal of y is at most 10".

II. $\frac{3}{2} < \sqrt{2}$

III. $(-3)\left|\, 6(-1)+2 \,\right| = 12$

A. I only

B. I and II only

C. II and III only

D. I, II, and III

E. None are true.

2. Simplify. Do not leave negative exponents in your answer.

$$\left(\frac{1}{4}x^{-3}y^{5}\right)\left(6x^{8}y^{2}\right)$$

A. $\frac{3y^{10}}{2x^{24}}$

B. $\frac{3x^{24}y^{10}}{2}$

C. $\frac{3x^{5}y^{7}}{2}$

D. $\frac{3y^{7}}{2x^{5}}$

E. $\frac{3x^{5}}{2y^{10}}$

3. Simplify: $\left(\frac{8x^{6}}{y^{12}}\right)^{-\frac{1}{3}}$

A. $\frac{y^{4}}{2x^{2}}$

B. $-\frac{8x^{\frac{17}{3}}}{3y^{\frac{35}{3}}}$

C. $\frac{x^{\frac{17}{3}}}{2y^{\frac{35}{3}}}$

D. $-\frac{8y^{4}}{3x^{2}}$

E. None of the above.

4. Perform the indicated operations and express as a polynomial.

$$\left(7x^4-3x^3+5x-1\right)-2\left(x^4-4x^3+x^2+3x\right)$$

A. $5x^4+5x^3+3x^2-6x-1$

B. $5x^4+5x^3-2x^2-x-1$

C. $5x^4-11x^3+2x^2+11x-1$

D. $5x^4-7x^3+x^2+8x-1$

E. None of the above.

5. Rationalize the denominator and simplify.

$$\frac{\sqrt{t}+1}{\sqrt{t}-3}$$

A. $\dfrac{t+1}{t-3}$

B. $\dfrac{t-2\sqrt{t}-3}{t-9}$

C. $\dfrac{t-3}{t+9}$

D. $\dfrac{t+4\sqrt{t}+3}{t-9}$

E. $\dfrac{t+1}{t-9}$

6. Which of the following is (are) true?

I. $\left(x-2y\right)^2=x^2+4y^2$

II. $\left(\sqrt{x}+\sqrt{y}\right)\left(\sqrt{x}-\sqrt{y}\right)=x-y$

III. $\dfrac{8x^4y^6-10x^8y^9}{2x^2y^3}=4x^2y^3-10x^8y^9$

A. I only

B. II only

C. I and II only

D. I, II, and III

E. None are true

7. Which of the following is a factor of $12x^2+5x-2$?

A. $12x+1$

B. $2x-1$

C. $3x-2$

D. $6x+1$

E. $4x-1$

8. Factor a^8-81b^4 completely.

A. $(a+9b)(a-9b)$

B. $(a^2+9b)(a+3b)(a-3b)$

C. $(a^2+3b)^2(a^2-3b)^2$

D. $(a^4+9b^2)(a^2+3b)(a^2-3b)$

E. $(a^2-3b)^4$

9. Perform the indicated operations and simplify.

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

A. $\dfrac{3x^2-6x-4}{x(2x+1)}$

B. $\dfrac{5x-4}{x(2x+1)}$

C. $\dfrac{x-4}{x(2x+1)}$

D. $\dfrac{3x^2-6x+1}{x(2x+1)}$

E. None of the above.

10. Simplify completely.

$$\frac{\frac{x+4}{x+1}-\frac{4}{x}}{x+2}$$

A. $\dfrac{x+2}{x+1}$

B. $\dfrac{x^2+1}{x(x+1)}$

C. $\dfrac{x-2}{x(x+1)}$

D. $\dfrac{(x-2)(x+2)^2}{x(x+1)}$

E. $\dfrac{1}{(x+1)(x+2)}$

11. Solve for *x*. Choose the answer that best describes the solution(s).

$$\frac{3}{x+5}+\frac{1}{x-5}=\frac{10}{x^2-25}$$

A. *x* is less than 3.

B. *x* is between 3 and 20.

C. *x* is greater than 20.

D. There is no solution for *x*.

E. All real *x* are solutions except $x=\pm 5$.

12. Solve $X(RY+R)=P$ for *R*.

A. $R=\dfrac{P}{XY+X}$

B. $R=\dfrac{P-X}{Y}$

C. $R=\dfrac{P}{2XY}$

D. $R=\dfrac{PX}{Y+1}$

E. Equation cannot be solved for *R*.

13. Bill has $80,000 to invest into two accounts. One account is a savings account which pays 3% simple interest. The other account is a much riskier fund, which pays 5% simple interest. Being conservative and investing a sum of money into each account, how much should Bill invest in the savings account in order to earn annual interest of $3450?

A. $19,800

B. $27,500

C. $32,150

D. $43,750

E. None of the above.

14. A girl can row a boat at a constant rate of 4 *mph* in still water. She rows upstream for 25 minutes and then rows downstream, returning to her starting point, in 18 minutes. If x represents the rate of the current, choose the equation that would be used to solve for x.

A. $\frac{5}{12}(4+x)=\frac{3}{10}(4-x)$

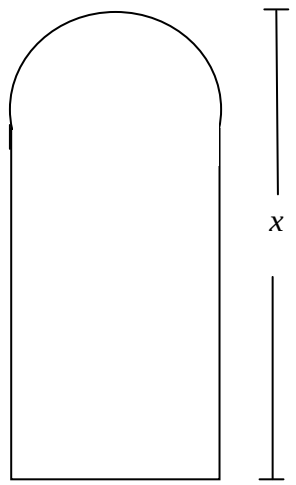
B. $4(25+x)=4(18-x)$

C. $\frac{5}{12}(4+x)+\frac{3}{10}(4-x)=43$

D. $\frac{5}{12}(4-x)=\frac{3}{10}(4+x)$

E. $\frac{5}{12}(4-x)+\frac{3}{10}(4+x)=43$

15. The design for an arched doorway is comprised of a rectangle surmounted by a semicircle (see the figure). The width of the door is to be 4 feet, but the height x is yet to be determined. If the area of the figure is to be 28 square feet, find x. Round your answer to the nearest tenth.



A. 5.4 feet

B. 5.9 feet

C. 7.4 feet

D. 8.1 feet

E. Cannot be determined