Acc. Pre-Calculus

Name:____________________

Ch. 1 Exam Review

Period_____

1. Find $(-5,2]\cap[-2,6]$ express your answer in all three formats.

$-5 \quad 2 \qquad -2 \quad 6 \qquad -2 \quad 2$

$\boxed{,\ -2 \le x \le 2,\ [-2,2]}$

2. If $A\{x|-4\le x<5\}$ *and* $B\{x|x\ge 1\}$, state your solutions in interval notation.

Find $A\cup B$ $\quad [-4,\infty)$

$-4 \quad 5 \quad A$

Find $A\cap B$ $\quad [1,5)$

$1 \quad B$

3. Perform the indicated operation and simplify: $(x^2+1)(x^2-x+2)$

$x^4 - x^3 + 2x^2$
$\quad + x^2 - x + 2$

$\boxed{x^4 - x^3 + 3x^2 - x + 2}$

Factor completely:

4. $2x^2-x-3$

$(2x-3)(x+1)$

5. $5z^2-18z-8$

$(5z+2)(z-4)$

$7 \; 3$
$1 \; 2$

6. $7x^2+23x+6$

$(7x+2)(x+3)$

7. $16x^6+250$

$2(8x^6+125)$

$2(2x^2+5)(4x^4-10x^2+25)$

8. $2a^3+16b^3$

$2(a^3+8b^3)$

$2(a+2b)(a^2-2ab+4b^2)$

9. $2(x^2+1)^2(x-3)+(x^2+1)(4x)(x-3)^2$

$2(x^2+1)(x-3)[(x^2+1)+2x(x-3)]$

x^2+1+2x^2-6x

$\boxed{2(x^2+1)(x-3)(3x^2-6x+1)}$

10. $4x(x^2-3)(x+2)^2-(x+2)^3(12x)(x^2-3)^2$

$4x(x^2-3)(x+2)^2[1-3(x+2)(x^2-3)]$

$1-3(x^3+2x^2-3x-6)$

$1-3x^3-6x^2+9x+18$

$\boxed{4x(x^2-3)(x+2)^2[-3x^3-6x^2+9x+19]}$

$X^{2-2}=X^0 \qquad \frac{X^2}{X^2}=1$

Simplify the expression and eliminate any negative exponents. Assume all letters denote positive numbers.

11. $\dfrac{\left(32x^5y^{\frac{-3}{2}}\right)^{\frac{2}{5}}}{\left(x^{\frac{5}{3}}y^{\frac{2}{3}}\right)^{\frac{3}{5}}}$

$\dfrac{2^{5\cdot\frac{2}{5}}x^{5\cdot\frac{2}{5}}y^{-\frac{3}{2}\cdot\frac{2}{5}}}{x^{\frac{5}{3}\cdot\frac{3}{5}}y^{\frac{2}{3}\cdot\frac{3}{5}}}$

$\dfrac{2^2x^2y^{-3/5}}{x^1y^{2/5}\,y^{3/5}} = \boxed{\dfrac{4x}{y}}$

12. $\dfrac{25\cdot5^{-1}\cdot5^{-1}}{\left(2^{-1}\cdot2^3\right)^{-1}}$

$\dfrac{5^2\cdot5^{-1}\cdot5^{-1}}{(2^2)^{-1}} = \dfrac{5^0}{2^{-2}}\;\dfrac{1}{}$

$\dfrac{1}{2^{-2}} = 2^2 = \boxed{4}$

13. $\left(2a^2b^3c\right)\left(\dfrac{3a^2b^3}{c^4}\right)^{-2}$

$2a^2b^3c\cdot\dfrac{c^{8\,9}}{3^2a^4b^{6}}$

$\dfrac{2c^9}{9a^2b^3}$

Simplify the expressions.

14. $\sqrt{32}\cdot\sqrt{18}$

$16\cdot2 \quad 9\cdot2$

$\sqrt{4\cdot4\;2\cdot2\;3\,3}$

$4\cdot2\cdot3$

$\boxed{24}$

15. $\sqrt{27}\cdot\sqrt{12}$

$27 \quad 12$

$3\cdot3\;3\cdot3\;2\cdot2$

$3\cdot3\cdot2$

$\boxed{18}$

16. $\sqrt[3]{36a^4b^7}\cdot\sqrt[3]{24ac^4}$

$\sqrt[3]{6\cdot6\cdot6\;4\,a^{5}b^{7}c^{4}}$

$\boxed{6a^1b^2c\sqrt[3]{4a^2bc}}$

17. $\sqrt[3]{x^5y^2}\cdot\sqrt[3]{16x^2y^4}$

$\sqrt[3]{2^4x^7y^6}$

$\boxed{2x^2y^2\sqrt[3]{2x}}$

18. $\dfrac{x^3+6x^2+5x}{x^2+12x+35}$ $\quad X(X^2+6X+5)$

$\dfrac{X\cancel{(X+5)}(X+1)}{(X+7)\cancel{(X+5)}}$

$\boxed{\dfrac{X(X+1)}{X+7}}$

19. $\dfrac{x^2-25}{x+5}\div\dfrac{x-5}{2x+10}$

$\dfrac{\cancel{(X-5)}\cancel{(X+5)}}{\cancel{X+5}}\cdot\dfrac{2(X+5)}{\cancel{X-5}}$

$\boxed{2(X+5)\text{ OR }2X+10}$

20. $\dfrac{x^3-4x}{x^2+4x+4}\cdot\dfrac{x^2-2x}{x^2+3x+2}$ $\quad X(X^2-4)$

$\dfrac{X(X-2)\cancel{(X+2)}}{(X+2)\cancel{(X+2)}}\cdot\dfrac{X(X-2)}{(X+2)(X+1)}$

$\boxed{\dfrac{X^2(X-2)^2}{(X+2)^2(X+1)}}$

21. $\dfrac{2}{x+1}+\dfrac{-1}{x^2+6x+5}$ $\quad (X+5)\;(X+5)\;(X+5)(X+1)$

$\dfrac{2X+10}{(X+5)(X+1)}+\dfrac{-1}{(X+5)(X+1)}$

$\boxed{\dfrac{2X+9}{(X+5)(X+1)}}$

22. $\dfrac{\frac{x}{2}+2}{\frac{x}{2}-2}$ $\quad 2\;2$

$\boxed{\dfrac{X+4}{X-4}}$

23. $\dfrac{1+\frac{-1}{h+1}}{\frac{1}{h-1}-1}$ $\quad (h+1)(h-1) \quad (h+1)(h-1)=h^2-1$

$\dfrac{(h^2-1)-h+1}{(h+1)-1(h^2-1)}$

$\dfrac{h^2-h}{} = \dfrac{h(h-1)}{-1(h^2-h-2)} = \dfrac{h(h+1)}{-1(h-2)(h+1)}$

24. $\dfrac{\frac{x-1}{x}+\frac{1}{x+1}}{\frac{1}{x+1}-\frac{x+1}{x}}$ $\quad X(X+1)\;X(X+1)$

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

$\boxed{\dfrac{X^2+X-1}{-X^2-X-1}}$

25. Rationalize the denominator:

A) $\frac{4}{\sqrt[3]{4x}} = \frac{4}{\sqrt[3]{2^2 x}} \cdot \frac{\sqrt[3]{2x^2}}{\sqrt[3]{2x^2}}$

$\frac{4\sqrt[3]{2x^2}}{2x} = \boxed{\frac{2\sqrt[3]{2x^2}}{x}}$

B) $\frac{6x}{\sqrt[4]{27x^2}} = \frac{6x}{\sqrt[4]{3^3 x^2}} \cdot \frac{\sqrt[4]{3^1 x^2}}{\sqrt[4]{3^1 x^2}}$

$\frac{6x\sqrt[4]{3x^2}}{3x} = \boxed{2\sqrt[4]{3x^2}}$

C) $\frac{4}{\sqrt{2}+\sqrt{6}} \cdot \frac{\sqrt{2}-\sqrt{6}}{\sqrt{2}-\sqrt{6}}$

$\frac{4\sqrt{2}-4\sqrt{6}}{2-6}$ -4

$\boxed{-\sqrt{2}+\sqrt{6}}$

D) $\frac{3}{6+\sqrt{2}} \cdot \frac{6-\sqrt{2}}{6-\sqrt{2}}$

$\frac{18-3\sqrt{2}}{36-2} = \boxed{\frac{18-3\sqrt{2}}{4}}$

Write the equation of the line,

26. through $(-1,-6)$ *and* $(2,-4)$

$m = \frac{-4+6}{2+1} = \frac{2}{3}$

$\boxed{y = \frac{2}{3}(x+1) - 6}$

27. through (1, 7) perpendicular to $x-3y+16=0$

$m = \frac{-1}{-3} = \frac{1}{3}$ $m_\perp = -3$

so

$\boxed{y = -3(x-1)+7}$

28. through X-intercept of 4 and y-intercept of 12

(4,0) (0,12)

$m = \frac{12-0}{0-4} = \frac{12}{-4} = -3$

$y = -3(x-0)+12$

$\boxed{y = -3x+12}$

29. The maximum weight M that can be supported by a beam is jointly proportional to its width w and the square of its height h and inversely proportional to its length l.

A) Write an equation that expresses this variation.

$\boxed{M = \frac{k \cdot w \cdot h^2}{l}}$

B) Find the constant of proportionality if a beam 4 in. wide, 6 in. high and 12 feet long can support a weight of 4800 lb.

w h l M

$4800 = \frac{k \cdot 4 \cdot 36}{12}$

$57600 = 144k$

$\boxed{400 = k}$

C) If a 10 ft. beam made of the same material is 3 in. wide and 10 in. high, what is the maximum weight it can support?

l w h

$M = \frac{400 \cdot 3 \cdot 100}{10} = \frac{120{,}00\cancel{0}}{1\cancel{0}} = \boxed{12{,}000 \text{ lbs}}$

30. The maximum range of a projectile is directly proportional to the square of its velocity. A baseball pitcher throws a ball at 60 mi/h, with a maximum range of 242 ft. What is his maximum range if he throws the ball at 70 mi/h?

R v^2

$R = k \cdot v^2$ ✓

$242 = k \cdot 60^2$

$242 = 3600k$

$k = \frac{242}{3600} = \frac{121}{1800}$ ✓

$R = \frac{121}{1800} \cdot 70^2$

$\boxed{R \approx 329.4 \text{ ft}}$