PreCalculus Name_____

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Algebra Review Day 1

Date_____ Period____

Simplify.

1) $5\sqrt[3]{(64xy^3)^2 \cdot x^3y^3}$

$5\sqrt[3]{(2^6xy^3)^2\, x^3y^3}$

$5\sqrt[3]{2^{12}x^2y^6x^3y^3}$

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

$80xy^3\sqrt[3]{x^2}$

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

Simplify. ~~**Your answer should contain only positive exponents with no fractional exponents in the denominator.**~~

2) $\dfrac{\left(u^{\frac{2}{3}}v^{\frac{3}{2}}\right)^{\frac{1}{2}}}{vu^{\frac{4}{3}} \cdot v^{-1}} \rightarrow \dfrac{u^{\frac{1}{3}}v^{\frac{3}{4}}}{u^{\frac{4}{3}}} = u^{\frac{1}{3}-\frac{4}{3}}v^{\frac{3}{4}} = u^{-1}v^{\frac{3}{4}}$ OR $\dfrac{v^{\frac{3}{4}}}{u}$

$v^1 \cdot v^{-1} = 1$ or $v\,v^{-1} = \frac{v}{v} = 1$

$v^{1+-1} = v^0$

Factor each completely.

3) $4n^3 - 12n^2 - n + 3$

$4n^2(n-3) - 1(n-3)$

$(n-3)(4n^2-1) \rightarrow (n-3)(2n-1)(2n+1)$

Difference of squares

Factor each.

4) $f(x) = x^5 + 2x^4 - 10x^3 - 20x^2 + 16x + 32$

$(-2)^5 + 2(-2)^4 - 10(-2)^3 - 20(-2)^2 + 16(-2) + 32$

*rational roots are $\pm 1, 2, 4, 8, 16, 32$

so $x = -2$ is a root

-2	1	2	-10	-20	16	32
		-2	0	20	0	-32
	1	0	-10	0	16	0

$(x+2)(x^4 - 10x^2 + 16)$

$(x+2)(x^2-8)(x^2-2)$

if $f(x) = 0$

$x+2=0$ $x^2-8=0$ $x^2-2=0$

$x=-2$ $x^2=8$ $x^2=2$

$x = \pm\sqrt{8}$ or $-\sqrt{8}$ $x = \pm\sqrt{2}$

5) $f(x) = 27x^5 - 45x^4 + 18x^3 - 30x^2 + 3x - 5$

*rational root possibilities

$\pm 5, 1, \pm\frac{5}{3}, \pm\frac{5}{9}, \pm\frac{5}{27}$

$\frac{5}{3}$ | 27 -45 18 -30 3 -5

45 0 30 0 5

27 0 18 0 3 0

$(x-\frac{5}{3})(27x^4+18x^2+3)$

$(3x-5)(9x^4+6x^2+1)$

$(3x-5)(3x^2+1)^2$

Simplify each expression.

6) $\frac{2}{5r^2-5r} - \frac{3}{r^2-1} + \frac{r}{2r^2+r-1}$

$\frac{(r+1)(2r-1)2}{5r(r-1)(r+1)(2r-1)} - \frac{5r\ 3(2r-1)}{(r+1)(r-1)\ 5r(2r-1)} + \frac{r\ 5r(r-1)}{(2r-1)(r+1)(5r)(r-1)}$

$\rightarrow 4r^2+2r-2-30r^2+15r+5r^3-5r^2$

$\rightarrow \frac{5r^3-31r^2+17r-2}{5r(2r-1)(r+1)(r-1)}$

Simplify.

7) $\frac{\sqrt{2}}{(\sqrt{5}-\sqrt{2})} \cdot \frac{(\sqrt{5}+\sqrt{2})}{(\sqrt{5}+\sqrt{2})} \rightarrow \frac{\sqrt{10}+2}{5-2} = \frac{\sqrt{10}+2}{3}$

$x \neq 0, 5$

Solve each equation. Remember to check for extraneous solutions.

8) $\frac{x+2}{x} = \frac{x+4}{x} - \frac{5x-30}{x^2-5x}$

$\frac{x+2}{x} = \frac{x+4}{x} - \frac{5x-30}{x(x-5)}$

$\frac{x+2-x-4}{x} = \frac{-5x+30}{x(x-5)}$

$\frac{-2}{x} = \frac{-5x+30}{x(x-5)}$

$-2x(x-5) = x(-5x+30)$

$-2x^2+10x = -5x^2+30x$

$3x^2-20x=0$

$x(3x-20)=0$

$x=0$ Extraneous, $\frac{20}{3}$

Solve each inequality.

9) $|r-7| \leq 1$

$r-7 \leq 1$ $\quad$ $r-7 \geq -1$

$+7 \ +7$ $\quad$ $+7 \ +7$

$r \leq 8$ $\quad$ $r \geq 6$

$6 \leq r \leq 8$

10) $|-5n| > 45$

$-5n > 45$ $\quad$ $-5n < -45$

$n < -9$ or $n > 9$

Write the slope-intercept form of the equation of the line through the given point with the given slope.

$y = mx+b$

11) through: $(-4, 3)$, slope $= -\frac{5}{4}$ Point-slope form $y-y_1 = m(x-x_1)$

$y-3 = -\frac{5}{4}(x+4)$

$y = -\frac{5}{4}x - 5 + 3$

$y = -\frac{5}{4}x - 2$

Write the slope-intercept form of the equation of the line through the given points.

12) through: $(1, -3)$ and $(4, 1)$

$m = \frac{y_2-y_1}{x_2-x_1} = \frac{1+3}{4-1} = \frac{4}{3}$

① $y = \frac{4}{3}x - \frac{4}{3} - 3\ \frac{3}{3}$

② $y = \frac{4}{3}x - \frac{16}{3} + 1\ \frac{3}{3}$

one option

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

2nd option

$y-1 = \frac{4}{3}(x-4)$

$y = \frac{4}{3}x - \frac{13}{3}$

Write the slope-intercept form of the equation of the line described.

⊥ → opposite, reciprocal

13) through: $(3, -4)$, parallel to $y = -2x - 3$

Same slope

$m = -2$

$y + 4 = -2(x - 3)$

14) through: $(3, 0)$, perp. to $6x + 4y - 4 = 0$

$\frac{4y}{4} = \frac{-6x}{4} + \frac{4}{4}$

$y = -\frac{3}{2}x + 1$ ⊥ slope $= \frac{2}{3}$

$y = \frac{2}{3}(x - 3)$

15) Assume that M varies directly as z, and $M = 126$ if $z = 14$. Write an equation that expresses this variation.

Direct: $y = kx$ Inverse: $k = xy$

where k is a constant

$M = kz$

$126 = k\,14$

$k = 9$

$M = 9z$

16) In a certain city, the property tax collected for a home varies directly to the valuation of the property. The tax collected on a \$105,000 home is \$2,846 per year. What is the value of a home if the tax collected is \$1,735?

$\frac{2,846}{105,000} = \frac{1,735}{x}$

$2846x = 182,175,000$

$x = \$64010\ 89$

17) The resistance of a wire varies directly as its length and inversely as the square of its diameter. A wire 50 m long and 1 cm in diameter has a resistance of 25 ohms. Find the resistance of a wire made of the same material that is 20 m long and has diameter 20 mm.

cm → 50m = 5000 cm

1cm

20m = 2000cm

20mm = 2 cm

R

$R = \frac{kL}{d^2}$

$25 = \frac{k \cdot 5000}{1}$

$k = \frac{1}{200}$

$k = \frac{25}{2500} = \frac{1}{100}$

$R = \frac{\frac{1}{200}L}{d^2}$ → $R = \frac{\frac{1}{200}(2000)}{2^2}$

R = 2.5 ohms