

### Are You Ready for Calculus Worksheet

#### Section I - Rules with Exponents

Simplify completely, eliminating all negative exponents from your final answer.

1.  $x^2 \cdot x^8 = x^{10}$

2.  $(2b)^4 = 16b^4$

3.  $(n^3)^3 \cdot (n^{-3})^3 = n^9 \cdot n^{-9} = n^0 = 1$

4.  $(-3f^3g)^4 = 81f^{12}g^4$

5.  $\frac{30y^4}{-5y^2} = -6y^2$

6.  $\frac{81p^6q^5}{(3p^2q)^2} = 9p^2q^3$

7.  $g^{(5/3)} \cdot g^{(7/3)} = g^4$

8.  $\sqrt{x} \sqrt[3]{x^2} = x^{7/6}$

9.  $\frac{a^{(-2)}}{6a^{(3)} \cdot a^{(-4)}} = \frac{\frac{1}{a^2}}{6 \cdot \frac{1}{a}} = \frac{1}{a^2} \cdot \frac{a}{6} = \frac{1}{6a}$

10.  $\frac{2c^{(1/8)}}{c^{(-1/16)} \cdot c^{(1/4)}} = \frac{2c^{1/8}}{c^{3/16}} = \frac{2}{c^{1/16}}$

#### Section II - Combining Mathematical Operations

Simplify completely.

1.  $\frac{b^2 - 100}{b^2} \cdot \frac{3b^2 - 31b + 10}{2b}$

2.  $\frac{x-4}{x^2+6x+9} \cdot \frac{x^2-2x-8}{x^2-2x-8}$

$= \frac{b^2-100}{b^2} \cdot \frac{2b}{3b^2-31b+10} = \frac{2b^3-200b}{3b^4-31b^3+10b^2}$

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

$= \frac{2b(b^2-100)}{b^2(3b^2-31b+10)} = \frac{2(b+10)(b-10)}{b(3b-1)(b-10)} = \frac{2(b+10)}{b(3b-1)}$

3.  $\frac{(z+1)}{(z+1)} \cdot \frac{4z}{z-4} + \frac{z+4}{z+1} \cdot \frac{(z-4)}{(z-4)}$

$\frac{(x+2)}{(x+2)} \cdot \frac{2x+1}{x-5} - \frac{4}{x^2-3x-10}$

$\frac{4z^2+4z+z^2-16}{(z+1)(z-4)} = \frac{5z^2+4z-16}{(z+1)(z-4)}$

$\frac{2x^2+5x-8}{(x+2)(x-5)}$

### Section III - Finding zeros

Solve each equation.

1.  $x^3 - 9x^2 + 14x = 0$

$$(x)(x^2 - 9x + 14) = 0$$

$$(x)(x - 7)(x - 2) = 0$$

$$x = 0, 2, 7$$

1.  $x^3 - 4x^2 + 4x = 0$

$$(x)(x^2 - 4x + 4) = 0$$

$$(x - 2)(x - 2) = 0$$

$$x = 0 \quad x = 2$$

$$(4x - 3)(x + 2) = 0$$

$$x = \frac{3}{4} \quad x = -2$$

2.  $4x^2 + 5x - 6 = 0$

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

2.  $x^4 - 10x^2 + 9 = 0$

$$(x^2 - 9)(x^2 - 1) = 0$$

$$x = \pm 1, \pm 3$$

### Section IV - Equations for Lines

1. Write an equation in slope-intercept form for the line that passes through (2, 0.5) and has a slope of  $-\frac{3}{4}$ .

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

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

$$\rightarrow \boxed{y = -\frac{3}{4}x + 2}$$

2. Write an equation in slope-intercept form for the line that passes through (0, -2) and is perpendicular to  $y = x - 2$ .

$$y + 2 = -1(x - 0)$$

$$\rightarrow y + 2 = -x$$

$$\boxed{y = -x - 2}$$

3. Write an equation in slope-intercept form for the line that has an x-intercept of -4 and a y-intercept of 4. (0, 4) (4, 0)

$$y - 4 = 1(x - 0)$$

$$\boxed{y = x + 4}$$

4. Write an equation in slope-intercept form for the line that passes through (6, -5) and is parallel to  $3x - \frac{1}{3}y = 3 \rightarrow 3x - 3 = \frac{1}{3}y \rightarrow y = 15x - 15$

$$y + 5 = 15(x - 6)$$

$$\rightarrow y + 5 = 15x - 90 \rightarrow \boxed{y = 15x - 95}$$

## Section V - End Behavior

List all vertical asymptotes, horizontal asymptotes, x-intercepts and y-intercepts.

$$1. f(x) = \frac{2(x^2+3x+2)}{x^2-2x-8} = \frac{2(x+2)(x+1)}{(x-4)(x+2)}$$

$$VA = x = 4 \quad x\text{-int} = -\frac{1}{2}$$

$$HA = y = 2 \quad y\text{-int} = x = -1$$

$$2. f(x) = \frac{x-1}{x^2-4x+3} = \frac{x-1}{(x-3)(x-1)}$$

$$VA = x = 3 \quad x\text{-int} = 1$$

$$HA = y = 0 \quad y\text{-int} = -\frac{1}{3}$$

$$3. f(x) = \frac{x^2+8x+12}{x+2} = \frac{(x+2)(x+6)}{x+2}$$

$$VA = \text{None} \quad x\text{-int} = -6$$

$$HA = \text{None} \quad y\text{-int} = 6$$

## Section VI - Values of Functions

Find the exact value of each function in its most simplified form.

$$1. \sin\left(\frac{\pi}{3}\right) = \frac{\sqrt{3}}{2}$$

$$2. \sec(0) = \frac{1}{\cos 0} = 1$$

$$3. \cos\left(\frac{5\pi}{3}\right) = \frac{1}{2}$$

$$4. \cot\left(\frac{-5\pi}{6}\right) = \frac{\cos}{\sin} = \frac{-\frac{\sqrt{3}}{2}}{-\frac{1}{2}} = \frac{\sqrt{3}}{2} \cdot \frac{2}{1} = \sqrt{3}$$

$$5. \sin\left(\frac{3\pi}{4}\right) = \frac{\sqrt{2}}{2}$$

$$6. \sec\left(\frac{3\pi}{2}\right) = \frac{1}{\cos \frac{3\pi}{2}} = \frac{1}{0} = \text{undefined}$$

$$7. \csc\left(\frac{\pi}{3}\right) = \frac{1}{\sin \frac{\pi}{3}} = \frac{1}{\frac{\sqrt{3}}{2}} = \frac{2}{\sqrt{3}} = \frac{2}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{2\sqrt{3}}{3}$$

$$8. \ln(\ln e) = \ln(1) = 0$$

9. Given  $f(x) = x^2 - 3x + 4$ , find  $f(x+2) - f(2)$ . Simplify

$$x^2 + 4x + 4 - 3x - 6 + 2$$

$$= x^2 + x$$