

Quiz 1 Solutions

Math 175

Quiz 1

Name: Solutions

1. Simplify and write the answers using positive exponents only.

$$\begin{aligned} \text{a. } (27a^6)^{-\frac{2}{3}} &= (3^3 a^6)^{-\frac{2}{3}} \\ &= (3^3)^{-\frac{2}{3}} (a^6)^{-\frac{2}{3}} = 3^{-2} a^{-4} \\ &= \frac{1}{3^2} \cdot \frac{1}{a^4} = \frac{1}{9a^4} \end{aligned}$$

$$\begin{aligned} \text{b. } \frac{3x^{-2}}{(2x^{-5}y)^{-3}} &= \frac{3x^{-2}}{2^{-3} x^{15} y^{-3}} = \frac{3 \cdot 2^3 \cdot y^3}{x^2 x^{15}} \\ &= \frac{24y^3}{x^{17}} \end{aligned}$$

$$\begin{aligned} \text{c. } (x^{\frac{1}{2}} + y^{\frac{1}{2}})^2 &= (x^{\frac{1}{2}} + y^{\frac{1}{2}})(x^{\frac{1}{2}} + y^{\frac{1}{2}}) = (x^{\frac{1}{2}})^2 + 2x^{\frac{1}{2}}y^{\frac{1}{2}} + (y^{\frac{1}{2}})^2 \\ &= x + 2x^{\frac{1}{2}}y^{\frac{1}{2}} + y \end{aligned}$$

2. Find the domain of the function (SHOW ME HOW, don't just guess): $s(x) = \sqrt{x^2 + 2x - 15}$

to take a square root we must have $x^2 + 2x - 15 \geq 0$

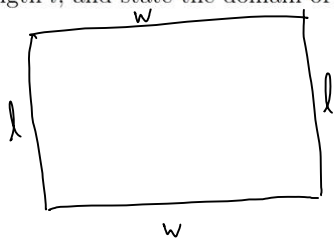
$$\begin{aligned} &(x+5)(x-3) \geq 0 \\ &\begin{array}{ccccccc} +++ & 0 & - & - & 0 & + & +++ \\ & | & & & | & & \\ & -5 & & & 3 & & \\ & \hline & & & & & & \\ & (-\infty, -5] & , & [3, \infty) & & & \end{array} \end{aligned}$$

The domain of $s(x)$ is all x in $(-\infty, -5]$ and $[3, \infty)$

3. For the function $f(x) = 3x^2 - 2x - 15$ form and simplify completely:

$$\begin{aligned} \frac{f(3+h) - f(3)}{h} &= \frac{(3(3+h)^2 - 2(3+h) - 15) - (3(3)^2 - 2(3) - 15)}{h} \\ &= \frac{(3(9 + 6h + h^2) - 6 - 2h - 15) - (3(9) - 6 - 15)}{h} \\ &= \frac{(\cancel{27} + 18h + 3h^2 - \cancel{6} - 2h - \cancel{15}) - (\cancel{27} - \cancel{6} - \cancel{15})}{h} = \frac{16h + 3h^2}{h} = \cancel{h} \frac{16 + 3h}{\cancel{h}} \\ &= 16 + 3h \end{aligned}$$

4. The area of a rectangle is 81 square inches. Express the perimeter $P(l)$ as a function of the length l , and state the domain of this function.



$$A = l \cdot w = 81 \Rightarrow w = \frac{81}{l}$$

$$P = 2l + 2w = 2l + 2\left(\frac{81}{l}\right)$$

$$P(l) = 2l + \frac{162}{l}$$

$$0 < l < \infty$$