

**Math 98**  
**Exam 1 Solutions**

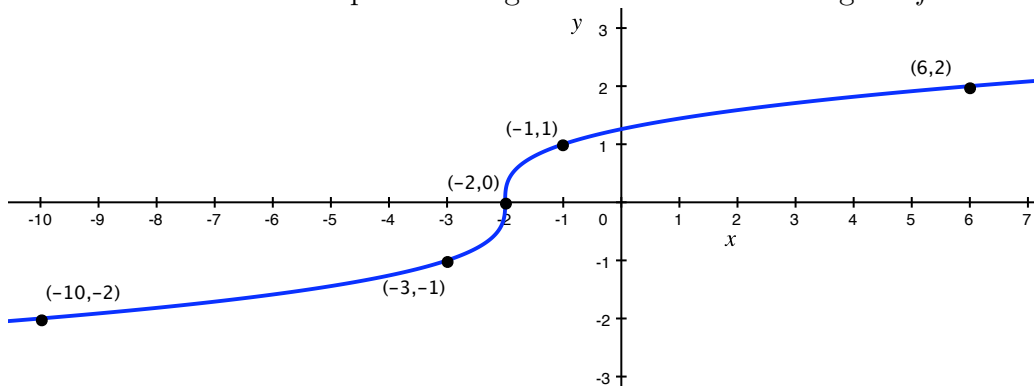
1. (15 pts.) Evaluate the following.

(a) (4 pts.)  $\sqrt[3]{-125} = -5$  since  $(-5)^3 = -125$

(b) (5 pts.)  $-81^{3/4} = -(81^{1/4})^3 = -3^3 = -27$

(c) (6 pts.)  $(\frac{1}{8})^{-2/3} = (\frac{8}{1})^{2/3} = 8^{2/3} = (8^{1/3})^2 = 2^2 = 4$

2. (15 pts.) Graph the function  $f(x) = \sqrt[3]{x+2}$  on the axis on the top of the next page. Plot and label at least 3 points and give the domain and range of  $f$ .



Domain:  $(-\infty, \infty)$

Range:  $(-\infty, \infty)$

3. (22 pts.) Simplify the following.

(a) (5 pts.)  $\sqrt{m^{22}} = (m^{22})^{1/2} = m^{22/2} = m^{11}$

(b) (5 pts.)  $\sqrt[3]{z^2} \cdot \sqrt[4]{z} = z^{2/3} \cdot z^{1/4} = z^{\frac{2}{3} + \frac{1}{4}} = z^{\frac{8}{12} + \frac{3}{12}} = z^{11/12}$

(c) (6 pts.)  $2x^{1/5}(x^{-11/5} + 3x^{4/5}) = 2x^{1/5} \cdot x^{-11/5} + 6x^{1/5} \cdot x^{4/5}$   
 $= 2x^{\frac{1}{5} - \frac{11}{5}} + 6x^{\frac{1}{5} + \frac{4}{5}}$   
 $= 2x^{-\frac{10}{5}} + 6x^{\frac{5}{5}}$   
 $= 2x^{-2} + 6x$   
 $= \frac{2}{x^2} + 6x$

(d) (6 pts.)  $\frac{(3r^{-1/2})^2}{r^{3/2}} = \frac{3^2(r^{-1/2})^2}{r^{3/2}} = \frac{9r^{-1}}{r^{3/2}} = \frac{9}{r^{3/2}r^1} = \frac{9}{r^{5/2}}$

4. (15 pts.) Find the distance between the points  $(2\sqrt{11}, -2)$  and  $(\sqrt{11}, 3)$ .

$$\begin{aligned}
 \text{Distance} &= \sqrt{(2\sqrt{11} - \sqrt{11})^2 + (-2 - 3)^2} = \sqrt{(\sqrt{11})^2 + (-5)^2} \\
 &= \sqrt{11 + 25} \\
 &= \sqrt{36} \\
 &= 6
 \end{aligned}$$

5. (23 pts.) Simplify the following.

(a) (5 pts.)  $\sqrt{108} = \sqrt{36 \cdot 3} = 6\sqrt{3}$

(b) (6 pts.)  $\sqrt[4]{16m^6n^{13}} = \sqrt[4]{16m^4n^{12}m^2n} = \sqrt[4]{16m^4n^{12}} \cdot \sqrt[4]{m^2n} = 2mn^3\sqrt[4]{m^2n}$

(c) (6 pts.)  $3\sqrt{12k} + \sqrt{18k} = 3\sqrt{4 \cdot 3k} + \sqrt{9 \cdot 2k}$   
 $= 3 \cdot 2\sqrt{3k} + 3\sqrt{2k}$   
 $= 6\sqrt{3k} + 3\sqrt{2k}$

(d) (6 pts.)  $\sqrt{25} + \sqrt{\frac{5}{x^2}} = 5 + \frac{\sqrt{5}}{\sqrt{x^2}} = 5 + \frac{\sqrt{5}}{x}$   
 $= \frac{5x}{x} + \frac{\sqrt{5}}{x}$   
 $= \frac{5x + \sqrt{5}}{x}$

6. (10 pts.)

Multiply and simplify the following.

(a) (5 pts.)  $(\sqrt{2} - 3)(2\sqrt{2} + 1) = 2(\sqrt{2})^2 + \sqrt{2} - 6\sqrt{2} - 3$   
 $= 2 \cdot 2 - 5\sqrt{2} - 3$   
 $= 4 - 5\sqrt{2} - 3$   
 $= 1 - 5\sqrt{2}$

Rationalize the denominator of the following.

(b) (5 pts.)  $\frac{6}{\sqrt{13}} = \frac{6}{\sqrt{13}} \cdot \frac{\sqrt{13}}{\sqrt{13}} = \frac{6\sqrt{13}}{13}$