

MAT1033 Test 4
(D. Howard 3-16)

Name Key

Simplify each of the following. Use exact values. Do not write as a decimal.

$$1. 81^{1/4} = \sqrt[4]{81} = \sqrt[4]{3 \cdot 3 \cdot 3 \cdot 3} = \boxed{3}$$

$$2. \sqrt[5]{-32} = \sqrt[5]{(-2)(-2)(-2)(-2)(-2)} = \boxed{-2}$$

$$3. \sqrt{\frac{9}{25}} = \frac{\sqrt{9}}{\sqrt{25}} = \boxed{\frac{3}{5}}$$

$$4. \sqrt{50x^{13}} = \sqrt{2 \cdot 5 \cdot 5 \cdot (x^2)^6 \cdot x} = \boxed{5x^6 \sqrt{2x}}$$

$$\begin{aligned} 5. \sqrt[5]{27} \cdot \sqrt[4]{9} &= 27^{1/5} \cdot 9^{1/4} = (3^3)^{1/5} (3^2)^{1/4} = 3^{3/5} \cdot 3^{2/4} \\ &= 3^{\frac{3}{5} + \frac{1}{2}} = 3^{\frac{6}{10} + \frac{5}{10}} = 3^{\frac{11}{10}} = \sqrt[10]{3^{11}} \\ &= \sqrt[10]{3^{10} \cdot 3} = \boxed{3 \sqrt[10]{3}} \end{aligned}$$

$$6. \sqrt{45} - 2\sqrt{5} = \sqrt{5 \cdot 3 \cdot 3} - 2\sqrt{5} = 3\sqrt{5} - 2\sqrt{5} = \boxed{\sqrt{5}}$$

FOIL

$$7. (\sqrt{x}-8)(\sqrt{x}+8) = \sqrt{x}^2 + 8\sqrt{x} - 8\sqrt{x} - 64$$

$$= \boxed{x-64}$$

$$8. (5+9i) - (6-i) =$$

$$5+9i - 6+i$$

$$\boxed{-1+10i}$$

$$9. (-3i)(8i) = -24i^2 = -24(-1) = \boxed{24}$$

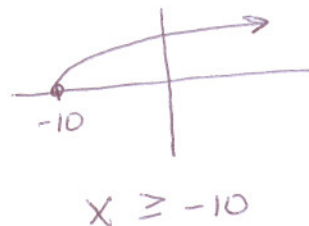
$$10. i^{37} = (i^4)^9 i = (1)^9 i = 1 \cdot i = \boxed{i}$$

11. Find the domain of $f(x) = \sqrt{x+10}$.

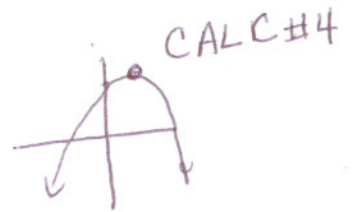
$$x+10 \geq 0$$

$$\boxed{x \geq -10}$$

OR



12. Given $f(x) = -x^2 + 2x + 3$, answer the following. OR



a. Find the vertex.

$$x = -\frac{b}{2a} = \frac{-2}{2(-1)} = 1 \quad \boxed{V(1,4)}$$

$$y = -(1)^2 + 2(1) + 3 = 4$$

b. Use the vertex to write $f(x)$ in vertex form.

$$y = a(x-h)^2 + k$$

$$\boxed{y = -(x-1)^2 + 4}$$

c. Find the axis of symmetry.

$$x = h \Rightarrow \boxed{x = 1}$$

d. Find the x-intercepts by using the quadratic formula. $0 = -x^2 + 2x + 3$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \quad a = -1 \quad b = 2 \quad c = 3$$

$$x = \frac{-(2) \pm \sqrt{(2)^2 - 4(-1)(3)}}{2(-1)} = \frac{-2 \pm \sqrt{4 + 12}}{-2}$$

$$x = \frac{-2 \pm \sqrt{16}}{-2} = \frac{-2 \pm 4}{-2} = \boxed{(-1,0) \quad (3,0)}$$

$$\frac{-2+4}{-2} = \frac{2}{-2} = \textcircled{-1}$$

$$\frac{-2-4}{-2} = \frac{-6}{-2} = \textcircled{3}$$

e. Find the y-intercept.

$$y = -(0)^2 + 2(0) + 3 = 3$$

$$\boxed{(0,3)}$$

f. Sketch a complete graph of $f(x)$.

