

The Final Exam consists of questions similar in style and content to those below. (There are answers at the end of this practice exam.)

1 Evaluate and simplify $\sqrt[3]{48}$.

a. $4\sqrt[3]{3}$

b. $8\sqrt[3]{6}$

c. $16\sqrt[3]{3}$

d. $2\sqrt[3]{6}$

2 Evaluate and simplify $(3 + \sqrt{2})(4 - \sqrt{2})$.

a. $14 + \sqrt{2}$

b. $10 + 7\sqrt{2}$

c. $10 + \sqrt{2}$

d. $14 + 7\sqrt{2}$

3 Evaluate and simplify $(3 + i)(4 - i)$.

a. $13 - i$

b. $13 + i$

c. $11 + i$

d. $11 - i$

4 Evaluate and simplify $\frac{3 + i}{4 - i}$.

a. $\frac{11 + 7i}{17} = \frac{11}{17} + \frac{7i}{17} = \frac{11}{17} + \frac{7}{17}i$

b. $\frac{13 + i}{17} = \frac{13}{17} + \frac{i}{17} = \frac{13}{17} + \frac{1}{17}i$

c. $\frac{13 + 7i}{17} = \frac{13}{17} + \frac{7i}{17} = \frac{13}{17} + \frac{7}{17}i$

d. $\frac{11 + i}{17} = \frac{11}{17} + \frac{i}{17} = \frac{11}{17} + \frac{1}{17}i$

5 Simplify the expression $\sqrt{18xy^4}$, assuming that the variables x and y take only positive values.

a. $2y\sqrt{3xy}$

b. $2y^2\sqrt{3x}$

c. $3y\sqrt{2xy}$

d. $3y^2\sqrt{2x}$

6 Simplify the expression $(\sqrt{x} + 3)(\sqrt{x} - 2)$, assuming that the variable x takes only positive values.

a. $2\sqrt{x} + 1$

b. $x + 1$

c. $x - 6$

d. $x + \sqrt{x} - 6$

7 Simplify the expression $\frac{x^2}{x^2 + 5x + 6} - \frac{4}{x^2 + 5x + 6}$, assuming that the variable x takes only positive values.

a. $\frac{-4}{5x + 6}$

b. $\frac{4}{5x + 6}$

c. $\frac{x - 2}{x + 3}$

d. $\frac{x + 2}{x - 3}$

8 Simplify the expression $\frac{2x - 6}{x^2 + 2x} + \frac{3}{x}$, assuming that the variable x takes only positive values.

a. $\frac{5x - 12}{x^2 + 2x}$

b. $\frac{5}{x + 2}$

c. $\frac{5x}{x^2 + 2x}$

d. $\frac{5x + 12}{x^2 + 2x}$

9 Solve the equation $5x^2 + 2x = 4$ in the complex-number system.

a. $x = \frac{-1 \pm \sqrt{19}i}{5} = -\frac{1 \pm \sqrt{19}i}{5} = -\frac{1}{5} \pm \frac{\sqrt{19}i}{5} = -\frac{1}{5} \pm \frac{\sqrt{19}}{5}i = -\frac{1}{5} \pm \frac{1}{5}\sqrt{19}i$

b. $x = \frac{1 \pm \sqrt{21}}{5} = \frac{1}{5} \pm \frac{\sqrt{21}}{5} = \frac{1}{5} \pm \frac{1}{5}\sqrt{21}$

c. $x = \frac{-1 \pm \sqrt{21}}{5} = -\frac{1 \pm \sqrt{21}}{5} = -\frac{1}{5} \pm \frac{\sqrt{21}}{5} = -\frac{1}{5} \pm \frac{1}{5}\sqrt{21}$

d. $x = \frac{1 \pm \sqrt{19}i}{5} = \frac{1}{5} \pm \frac{\sqrt{19}i}{5} = \frac{1}{5} \pm \frac{\sqrt{19}}{5}i = \frac{1}{5} \pm \frac{1}{5}\sqrt{19}i$

10 Solve the equation $x - \sqrt{x} - 6 = 0$

a. $x = 4$ or $x = 9$

b. $x = 9$

c. No solution

d. $x = 4$

- 11** Solve the equation $\frac{3}{2x+4} = \frac{2}{x+3}$.
- a. $x = 1$
 - b. $x = 1$ or $x = -2$ or $x = -3$
 - c. $x = 1$ or $x = -2$
 - d. $x = 1$ or $x = -3$
- 12** Give the solution set of $2 \leq x < 12$ in interval notation.
- a. $[2, 12)$
 - b. $(2, 12]$
 - c. $(12, 2]$
 - d. $[12, 2)$
- 13** A rectangular hallway is four times as long as it is wide. Its area is 64 square feet. What are its length and width?
- a. 8 ft by 8 ft
 - b. 8 ft by 32 ft
 - c. 4 ft by 16 ft
 - d. 1 ft by 4 ft
- 14** The width of a computer screen is 5 centimetres greater than its height. The diagonal distance is 25 centimetres. What is the width of the screen?
- a. 10 cm
 - b. 20 cm
 - c. 15 cm
 - d. 16 cm
- 15** Suppose that it takes you 5 minutes to do an algebra problem, but it takes me only 3 minutes to do a problem. If we split up a test with 24 problems and work on them at the same time, then how fast can we finish it?
- a. 45 min
 - b. $\frac{192}{5}$ min = 38.4 min = 38 min 24 sec
 - c. 3 min
 - d. 192 min = 3 hr 12 min
- 16** Suppose that a machine part should be 3 millimetres wide within a tolerance of 0.004 millimetre. What are the smallest and largest widths that it can have?
- a. The smallest is 2.996 mm, and the largest is 3.004 mm.
 - b. The smallest is 3.000 mm, and the largest is 3.004 mm.
 - c. The smallest is 3.004 mm, and the largest is 2.996 mm.
 - d. The smallest is 2.996 mm, and the largest is 3.000 mm.

17 Consider the equation $y + 1 = x^2 + x$, and consider its graph in the (x, y) -plane. Which of the following points is on this graph?

- a. $(0, 1)$
- b. $(1, 1)$
- c. $(0, 3)$
- d. $(1, 3)$

18 If $f(x) = \frac{x^2 + x}{x^2 - 1}$, then what is the domain of f ?

- a. $\text{dom } f = \{x \mid x \neq -1, x \neq 0, x \neq 1\}$
- b. $\text{dom } f = \{x \mid x \neq -1\}$
- c. $\text{dom } f = \{x \mid x \neq -1, x \neq 1\}$
- d. $\text{dom } f = \{x \mid x \neq 1\}$

19 Consider the function f given by $f(x) = x^2 + 3$. If $x = 4$, then what is $f(x)$?

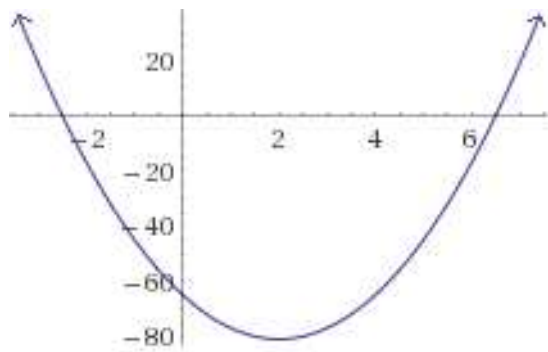
- a. $f(x) = \pm 1$
- b. $f(x) = 19$
- c. $f(x) = 28$
- d. $f(x) = 4x^2 + 12$

20 Given

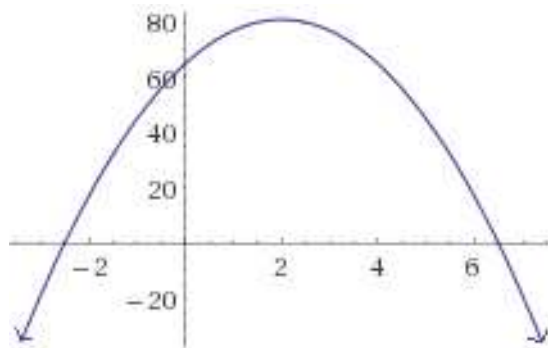
$$f(x) = 4x^2 - 16x - 65,$$

sketch a graph of f .

a.

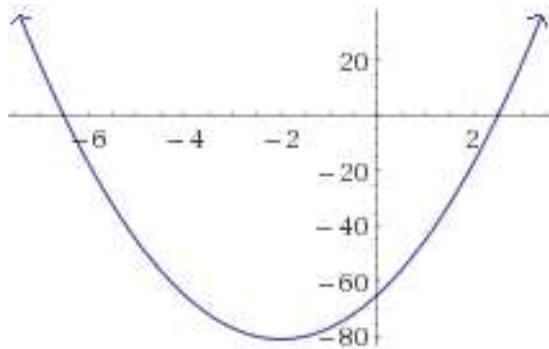


b.

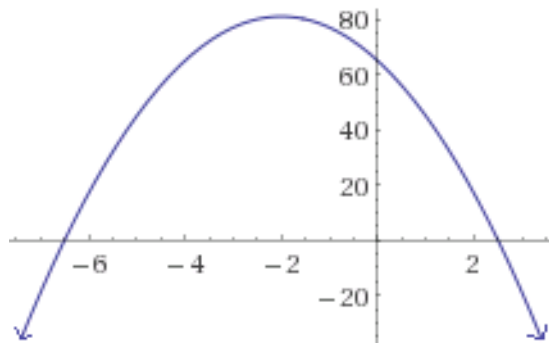


(More answers on the next page)

c.



d.



- 21 Fill in the blank: If a and b are real numbers, n is an odd natural number, and $b = a^n$, then a is the real n th _____ of b .
- 22 A number of the form $a + bi$, where a and b are real numbers, is called a(n) _____ number.
- 23 A(n) _____ expression is the result of dividing two polynomials.
- 24 A graph of a relation that satisfies the Vertical-Line Test is the graph of a(n) _____.

Answers

1 D, 2 C, 3 B, 4 A, 5 D, 6 D, 7 C, 8 B, 9 C, 10 B, 11 A, 12 A, 13 C, 14 B, 15 A, 16 A, 17 B, 18 C, 19 B, 20 A.

21 root

22 complex

23 rational

24 function