

# MTH 28, Test 3, V. 2, 25/11/24

Prof. Luis Fernández

NAME: \_\_\_\_\_ SOLUTION \_\_\_\_\_

There are 22 questions. Some are multiple choice and some are free response.  
Each question is worth 5 points over 100 (so 10 points are extra credit).  
For multiple-choice questions, just circle your answer.  
For free-response questions, SHOW ALL WORK to receive credit.

1. Write the expression

$$\left(\frac{a^{-3}}{3b^{-1/6}}\right)^{-1}$$

in the form  $\frac{n \cdot a^r}{b^t}$ .

Solution:  $\boxed{\frac{3a^3}{b^{\frac{1}{6}}}}$

2. Evaluate the expression:  $125^{-\frac{2}{3}}$

Solution:  $\boxed{\frac{1}{25}}$

3. Simplify each of the following:

Solution:

(a)  $\sqrt{32} = \boxed{4\sqrt{2}}$

(b)  $\sqrt{27} = \boxed{3\sqrt{3}}$

(c)  $\sqrt{18} = \boxed{3\sqrt{2}}$

(d)  $\sqrt{50} = \boxed{5\sqrt{2}}$

(e)  $\sqrt{72} = \boxed{6\sqrt{2}}$

(f)  $\sqrt{300} = \boxed{10\sqrt{3}}$

4. Write the expression

$$\sqrt{108} - \sqrt{48}$$

in the form  $A\sqrt{C}$ .

Solution:  $\boxed{2\sqrt{3}}$

5. Find the product

$$(-5\sqrt{3})(4\sqrt{5})$$

and write it in simplest radical form  $A\sqrt{C}$ .

**Solution:**  $\boxed{-20\sqrt{15}}$

6. Write using rational exponents:  $\sqrt[3]{x^{10}}$

**Solution:**  $\boxed{x^{\frac{10}{3}}}$

7. Multiply and simplify

$$(8 + 2\sqrt{2})(8 - 2\sqrt{2})$$

**Circle the answer.**

**Solution:**

(a) 56

(b)  $72 - 32\sqrt{2}$

(c)  $72 + 32\sqrt{2}$

(d) 72

8. Simplify.

$$-4\sqrt{27} - 2\sqrt{12} - 2\sqrt{147}$$

**Circle the answer.**

**Solution:**

(a)  $-8\sqrt{27}$

(b)  $-8\sqrt{3}$

(c)  $-30\sqrt{9}$

(d)  $-30\sqrt{3}$

9. Simplify the expression

$$\sqrt{\frac{75}{11}},$$

and write it in the form  $\frac{A\sqrt{B}}{C}$ .

**Solution:**  $\boxed{\frac{5\sqrt{33}}{11}}$ .

10. Rationalize (that is, write without radicals in the denominator):

$$\frac{\sqrt{13} - \sqrt{3}}{\sqrt{13} + \sqrt{3}}$$

**Solution:**  $\boxed{\frac{8 - \sqrt{39}}{5}}$

11. Multiply and simplify

$$(3 + 2\sqrt{7})^2$$

**Circle the answer.**

**Solution:**

(a)  $23 + 12\sqrt{7}$

(b)  $37 + 12\sqrt{7}$

(c) 35

(d)  $37 - 12\sqrt{7}$

12. Simplify completely

$$\frac{\sqrt{2}\sqrt{30}}{\sqrt{5}}$$

**Circle the answer.**

**Solution:**

(a)  $\sqrt{12}$

(b)  $4\sqrt{3}$

(c)  $2\sqrt{3}$

(d)  $3\sqrt{2}$

13. Solve the equation

$$\sqrt{2x-1} - 5 = 0$$

Solution:  $x = 13$

14. Write  $\sqrt{-32}$   
as the product of a real number and  $i$ .

Circle the answer.

Solution:

(a)  $-4\sqrt{2}$

(b)  $-2\sqrt{4i}$

(c)  $4\sqrt{2}i$

(d)  $2\sqrt{4i}$

15. Solve the equation

$$\sqrt{4x} = x - 3.$$

Solution:  $x = 9$

(Note that there is another “solution”,  
 $x = 1$ , but it does not work.)

16. Solve the equation

$$\sqrt{2x+1} = 3\sqrt{x-1}$$

Solution:  $x = \frac{10}{7}$

17. Solve the quadratic equation

$$3x^2 + 8x - 3 = 0$$

and write the solutions in simplified form.

**Solution:**  $x = -3$  and  $x = \frac{1}{3}$ .

18. Multiply

$$(-11 - 6i)(-8 - 9i)$$

**Solution:**  $34 + 147i$ .

19. Evaluate the expression

$$\frac{-3 + i}{1 + 4i}$$

and write the result in the form  $a + bi$ .

**Solution:**  $\frac{1 + 13i}{17}$ .

20. Evaluate the expression

$$(7 + 2i) + (-5 + 7i)$$

and write the result in the form  $a + bi$ .

**Solution:**  $2 + 9i$ .

**21.** Solve the quadratic equation

$$x^2 - 5x - 5 = 0$$

and write the solutions in simplified form.

**Solution:**  $x = \frac{5 + 3\sqrt{5}}{2}$  and  $x = \frac{5 - 3\sqrt{5}}{2}$ .

**22.** Solve the equation

$$2x^2 - 14 = 0$$

**Solution:**  $x = \pm\sqrt{7}$ .