MTH 28, Test 3, V. 3, 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.

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1. 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) $\sqrt{300} = \boxed{10\sqrt{3}}$

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

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

3. Write the expression

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

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

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

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

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

5. Write the expression

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

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

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

6. Find the product

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

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

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

7. Multiply and simplify

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

Circle the answer.

Solution:

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

(b) 56

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

(d) 72

8. Simplify.

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

Circle the answer.

Solution:

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

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

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

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

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

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

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

10. Simplify the expression

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

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

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

11. Simplify completely

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

Circle the answer.

Solution:

(a) $4\sqrt{3}$

(b) $\sqrt{12}$

(c) $2\sqrt{3}$

(d) $3\sqrt{2}$

12. Multiply and simplify

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

Circle the answer.

Solution:

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

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

(c) 35

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

13. Solve the equation

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

Solution: $\boxed{x = 13}$

14. Solve the equation

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

Solution: $\boxed{x = \dfrac{10}{7}}$

15. Multiply

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

Solution: $\boxed{34 + 147\,i}$.

16. Write $\quad \sqrt{-32}$

as the product of a real number and i.

Circle the answer.

Solution:

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

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

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

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

17. Solve the quadratic equation

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

and write the solutions in simplified form.

Solution: $\boxed{x = \dfrac{5 + 3\sqrt{5}}{2} \text{ and } x = \dfrac{5 - 3\sqrt{5}}{2}}$.

18. Solve the equation

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

Solution: $\boxed{x = 9}$

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

19. Evaluate the expression

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

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

Solution: $\boxed{\dfrac{1 + 13i}{17}}$.

20. Solve the quadratic equation

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

and write the solutions in simplified form.

Solution: $\boxed{x = -3 \text{ and } x = \dfrac{1}{3}}$.

21. Evaluate the expression

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

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

Solution: $\boxed{2 + 9i}$

22. Solve the equation

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

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