# MTH 06, Test 4, V. 2, 12/07/21 Prof. Luis Fernández

**NAME:** SOLUTION

**There are 25 questions. Some are multiple choice and some are free response.**
**Each question is worth 4 points over 100, except question 2 which is worth 12 points (so 8 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

$$\left(\frac{x^3y}{y^2}\right)^{6/7}$$

in the form $\dfrac{x^r}{y^t}$.

**Solution:** $\boxed{\dfrac{x^{\frac{18}{7}}}{y^{\frac{6}{7}}}}$

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

**3.** Write the expression $\sqrt[3]{-72}$ in simplest radical form.

**Solution:** $\boxed{-2\sqrt[3]{9}}$

**4.** Write the expression

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

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

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

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

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

**6.** Write the expression

$$\left(\frac{x^3y}{y^2}\right)^{6/7}$$

in the form $\dfrac{x^r}{y^t}$.

**Solution:** $\boxed{\dfrac{x^{\frac{18}{7}}}{y^{\frac{6}{7}}}}$

**7.** Write the expression

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

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

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

**8.** Find the product

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

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

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

**9.** 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) $37-12\sqrt{7}$

**10.** 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) $3\sqrt{2}$

**11.** 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) $72$

**12.** 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) $-30\sqrt{3}$

**13.** Subtract and simplify

$$7\sqrt{8}-9\sqrt{18}$$

**Solution:** $\boxed{-13\sqrt{2}}$

**14.** Solve the equation

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

**Solution:** $\boxed{x=13}$

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

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

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

**16.** Simplify the expression

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

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

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

**17.** Evaluate the expression

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

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

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

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

**Circle the answer.**

**Solution:**

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

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

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

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

**20.** Solve the equation

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

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

**21.** Evaluate the expression

$$(-1 + 3i) - (7 - 3i)$$

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

**Solution:** $\boxed{-8 + 6i}$

**22.** Multiply

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

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

**23.** Evaluate the expression

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

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

**Solution:** $\boxed{\dfrac{1-13i}{-3}}$.

**24.** Solve the quadratic equation

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

and write the solutions in simplified form.

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

**25.** Solve the quadratic equation

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

and write the solutions in simplified form.

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