Exam 2 Math 100 Spring 2015

Work all problems, put your answers on the included scantron sheet. THIS INCLUDES YOUR ID!

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) Euclid's Prime Number Theorem is proved by "proof by contradiction"; what is the starting statement that leads to an absurdity? 1) _____

A) "Suppose that 2 is prime..."
B) "Suppose that there are infinitely many primes..."
C) "Suppose that $\sqrt{2}$ is a rational number..."
D) "Suppose that there are only finitely many primes..."

Solve the problem relating to the Fibonacci sequence.

2) $F_{25} = 75{,}025$, $F_{26} = 121{,}393$ 2) _____

Find F_{27}.

A) $F_{27} = 46{,}368$
B) $F_{27} = 196{,}418$
C) $F_{27} = 242{,}786$
D) $F_{27} = 167{,}761$

Express the rational number as a terminating or repeating decimal number.

3) $\frac{8}{9}$ 3) _____

A) $0.\overline{9}$
B) $0.\overline{89}$
C) $0.\overline{8}$
D) $0.\overline{98}$

Give the prime factorization of the number. Use exponents when possible.

4) 396 4) _____

A) $2^2 \times 3^2 \times 11$
B) $2^3 \times 3^2 \times 11$
C) $2^4 \times 11$
D) $3^4 \times 11$

5) The number 120 can be factored as $120=2\times2\times5\times3\times2$. What does the Fundamental Theorem of Arithmetic (FTA) tell us about this factorization? 5) _____

A) Any other factorization of 120 must be a rearrangement of the numbers 2, 2, 2 3, and 5.
B) Any multiple of 120 is divisible by 2, 3, or 5
C) Every divisor of 120 is divisible by 2, 3, or 5
D) Nothing, FTA does not apply since 120 is not prime

Find all natural number factors of the number.

6) 42 6) _____

A) 1, 7, 42
B) 7, 6, 14, 42
C) 1, 2, 3, 7, 6, 14, 21, 42
D) 1, 2, 3, 7, 6, 14, 28, 42

Find the least common multiple of the two numbers.

7) 8, 28 7) _____

A) 14
B) 224
C) 56
D) 28

8) Which of the following modern words is NOT named after the 9th century scholar Abu Jafar Muhammad ibn Musa al-Khwarizmi (or his books)? 8) _____

A) Algebra B) Algorithm C) Arithmetic

9) Which of the following numbers is rational? 9) _____

A) 0.12112111211112111112...

B) π

C) $\zeta(3)$ (the "Riemann zeta function" at 3)

D) 1.21341341341341341 34...

10) Which is a true statement about the Golden Ratio Φ. 10) _____

A) $\Phi = \frac{1-\sqrt{5}}{2}$

B) The height of the Acropolis divided by the width is φ

C) $\frac{\Phi}{1} = \frac{1}{\Phi - 1}$

D) $\Phi^2 + \Phi + 1 = 0$

Decide if the number is rational or irrational.

11) $0.\overline{148}$ 11) _____

A) Rational B) Irrational

12) Which is a true statement about the Golden Ratio Φ. (F_n is the nth Fibonacci number.) 12) _____

A) $\frac{F_{n+1}}{F_n}$ is close to Φ when n is large B) $\frac{F_{n+1}}{F_n} = \Phi$

C) $\frac{F_n}{F_{n+1}}$ is close to Φ when n is large D) $\frac{F_n}{F_{n+1}} = \Phi$

13) Find integers r and s such that GCF(30,42) = r×30 + s×42 13) _____

A) r = 3, s = 2 B) r = 2, s = 3 C) r = 3, s = −2 D) r = 2, s = −3

14) When you use Euclid"s Algorithm to find the GCF of 225 and 144, all but the one of the following numbers show up. Which one does not appear? 14) _____

A) 9 B) 81 C) 18 D) 62

Determine whether the statement is true or false.

15) If a number is divisible by both 3 and 9 then it is divisible by 27. 15) _____

A) True B) False

9 is not divisible by 27

16) Suppose that $a=\frac{4-\sqrt{7}}{3}$, and consider the following algebraic argument: 16) _____

$$a=\frac{4-\sqrt{7}}{3}=\frac{\sqrt{16}-\sqrt{7}}{3}=\frac{\sqrt{16-7}}{3}=\frac{\sqrt{9}}{3}=\frac{3}{3}=1$$

Which of the following is true?

A) The argument is correct, and shows that a is algebraic.
B) The argument is correct, and shows that a is rational.
C) The argument is correct, but you cannot conclude (A) or (B) from it.
D) The argument is incorrect, there is an algebra error.

Find the number of divisors of the number.

17) $2^4 \times 11$ 17) _____

A) 8 B) 4 C) 10 D) 2

Find the greatest common factor of the two numbers.

18) 104, 567 18) _____

A) 52 B) 91 C) 1 D) 6

19) What can we say about the number $x = 3.45\overline{45}$? 19) _____

A) x is irrational B) $x=\frac{345}{100}$ C) $x=\frac{31}{9}$ D) $x=\frac{342}{99}$

20) What is LCM of $2^3\times3^2\times7\times11^2\times23$ and $2^2\times5^3\times7^2\times11$? 20) _____

A) 308 B) 154

C) $2^3\times3^2\times5^3\times7^2\times11^2\times23$ D) $2^3\times3^2\times7\times11^2\times23$

Decide whether the rational number yields a repeating or a terminating decimal.

21) $\frac{7}{18}$ 21) _____

A) Repeating B) Terminating

22) Find all values for the missing digit x that makes 43x1 divisible by 3. 22) _____

A) {1, 4, 7} B) {1, 2, 6} C) {1, 2, 3, 4, 5} D) {0, 3, 6, 9}