

Potential Exam Questions for the Midterm in  
Math 170 (Fall 2007)

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- (1) Let  $F_n$  represent the  $n$ th Fibonacci number. What is  $F_5 + F_7$ ?
- (2) Let  $F_n$  represent the  $n$ th Fibonacci number. What is  $F_4 + F_6$ ?
- (3) Let  $F_n$  represent the  $n$ th Fibonacci number. What is  $F_3 \times F_5$ ?
- (4) What is  $[1, 1, 1]$  as a fraction in lowest terms?
- (5) What is  $[1, 2, 3]$  as a fraction in lowest terms?
- (6) What is  $[2, 2, 2]$  as a fraction in lowest terms?
- (7) What is  $\phi(3 \times 5 \times 7)$ ?
- (8) What is  $\phi(7 \times 11 \times 13)$ ?
- (9) What is  $\phi(7 \times 11^2)$ ?
- (10) Use the extended Euclid's Algorithm to find  $\gcd(8, 18)$  as well as  $x, y$  such that  $8x + 18y = \gcd(8, 18)$ ?
- (11) Use the extended Euclid's Algorithm to find  $\gcd(21, 33)$  as well as  $x, y$  such that  $21x + 33y = \gcd(21, 33)$ ?
- (12) Use the extended Euclid's Algorithm to find  $\gcd(12, 55)$  as well as  $x, y$  such that  $12x + 55y = \gcd(12, 55)$ ?
- (13) What does  $(11^2 + 8 \times 4 + 12^2) \bmod 8$  equal?
- (14) What does  $(11^2 + 8 \times 4 + 12^2) \bmod 9$  equal?
- (15) What does  $(11^2 + 8 \times 4 + 12^2) \bmod 10$  equal?

- (16) If the following are the first 11 digits of a bar code, what is the 12 (or check) digit?

1 2 3 4 5 6 5 4 3 2 1

- (17) If the following are the first 11 digits of a bar code, what is the 12 (or check) digit?

1 1 1 1 1 1 1 1 1 1 1

- (18) If the following are the first 11 digits of a bar code, what is the 12 (or check) digit?

2 2 2 2 2 2 2 2 2 2 2

- (19) What does  $3^{49} \bmod 7$  equal? What is  $\phi(7)$ ?

- (20) What does  $4^{42} \bmod 11$  equal? What is  $\phi(11)$ ?

- (21) What does  $5^{49} \bmod 13$  equal? What is  $\phi(13)$ ?

- (22) What is  $\phi(15) = \phi(3 \times 5)$ ? What does  $4^{49} \bmod 15$  equal?

- (23) What is  $\phi(33) = \phi(3 \times 11)$ ? What does  $2^{64} \bmod 33$  equal?

- (24) What is  $\phi(26) = \phi(2 \times 13)$ ? What does  $3^{50} \bmod 26$  equal?

- (25) Which of the following are rational?

$\sqrt{2^2 \cdot 3}$ ,  $\sqrt{3 \cdot 5}$ ,  $\sqrt{2^2 \cdot 5^2}$ ,  $\sqrt{3^2 \cdot 7^4}$

- (26) Which of the following are rational?

$\sqrt{2 \cdot 7^2}$ ,  $\sqrt{5^3}$ ,  $\sqrt{2^2 \cdot 3^6}$ ,  $\sqrt{2^2 \cdot 3 \cdot 5^2}$

- (27) Which of the following are rational?

$\sqrt{2^2 \cdot 3^2}$ ,  $\sqrt{5^4}$ ,  $\sqrt{2^{100}}$ ,  $\sqrt{2 \cdot 3 \cdot 5 \cdot 7 \cdot 11}$

- (28) What is  $0.\overline{2} = 0.2222\dots$  as a fraction in lowest terms?
- (29) What is  $0.\overline{12} = 0.1212\dots$  as a fraction in lowest terms?
- (30) What is  $0.\overline{21} = 0.2121\dots$  as a fraction in lowest terms?

For the next three problems consider the following substitution code

<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>	<i>F</i>	<i>G</i>	<i>H</i>	<i>I</i>	<i>J</i>	<i>K</i>	<i>L</i>	<i>M</i>
↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
<i>T</i>	<i>H</i>	<i>E</i>	<i>Q</i>	<i>U</i>	<i>I</i>	<i>C</i>	<i>K</i>	<i>B</i>	<i>R</i>	<i>O</i>	<i>W</i>	<i>N</i>
<i>N</i>	<i>O</i>	<i>P</i>	<i>Q</i>	<i>R</i>	<i>S</i>	<i>T</i>	<i>U</i>	<i>V</i>	<i>W</i>	<i>X</i>	<i>Y</i>	<i>Z</i>
↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
<i>F</i>	<i>X</i>	<i>J</i>	<i>M</i>	<i>P</i>	<i>D</i>	<i>V</i>	<i>L</i>	<i>A</i>	<i>Z</i>	<i>Y</i>	<i>G</i>	<i>S</i>

- (31) What do you get when you encode the phrase  
CLASS IS FUN!
- (31) What do you get when you encode the phrase  
SEMESTER
- (33) What do you get when you decode the phrase  
TWNXDV QXFU?