Directions:

a. DO NOT OPEN YOUR EXAM BOOKLET UNTIL YOU HAVE BEEN TOLD TO BEGIN.

b. This exam booklet contains 40 questions, each of which will be weighted equally. The exam is worth 200 points (20% of your course grade).

c. You may use one 8.5" x 11" note sheet and a paper dictionary during the examination. No calculating devices or other reference materials may be used during the examination.

d. You may not ask questions once the examination has begun.

If there is a structural problem with your exam booklet, such as a missing page or poorly printed page, please bring your exam booklet to the proctor.

If you believe that a question is ambiguous or contains a typographic error, write your interpretation of the question on the same page as the question, then put a note on the cover sheet of your exam booklet.

e. You should choose the single best alternative for each question, even if you believe that a question is ambiguous or contains a typographic error. If a question has more than one correct answer, full credit will be awarded for any correct answer.

f. Please fill in the requested information at the top of this exam booklet.

g. Use a #2 pencil to encode any information on the OMR form.

h. Please encode the following on the OMR form:

   -- Last name and first initial
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   -- Exam form (3 X)

i. Only answers recorded on your OMR form will be counted for credit. Completely erase any responses on the OMR form that you wish to delete.

j. You must turn in this exam booklet and the OMR form when you have completed the exam. When leaving, please be courteous to those still taking the exam.

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*  Exam Key                                                                 *
*                                                                           *
*  01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 *
*   E  B  A  C  C  B  D  A  A  A  B  D  C  D  E  A  D  A  A  B  A  B  C  E *
*                                                                           *
*  25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40                          *
*   D  D  C  E  E  A  C  C  D  B  D  A  B  D  C  A                          *
******************************************************************************
### Figure 1

```python
A, B, C, D = 0, 0, 0, 0

A = 16
while A >= 0:
    A -= 4
    if A%3 == 1:
        B += 1
        break
    elif A%2 == 1:
        C += 1
        continue
    D += 1

print( A )  # Line 1
print( B )  # Line 2
print( C )  # Line 3
print( D )  # Line 4
```

01. Which of the following statements about the Python code labeled "Line 1" in Figure 1 is correct?

A) It will display 0 when the program is executed.
B) It will display 1 when the program is executed.
C) It will display 2 when the program is executed.
D) It will display 3 when the program is executed.
E) None of the above.

02. Which of the following statements about the Python code labeled "Line 2" in Figure 1 is correct?

A) It will display 0 when the program is executed.
B) It will display 1 when the program is executed.
C) It will display 2 when the program is executed.
D) It will display 3 when the program is executed.
E) None of the above.

03. Which of the following statements about the Python code labeled "Line 3" in Figure 1 is correct?

A) It will display 0 when the program is executed.
B) It will display 1 when the program is executed.
C) It will display 2 when the program is executed.
D) It will display 3 when the program is executed.
E) None of the above.

04. Which of the following statements about the Python code labeled "Line 4" in Figure 1 is correct?

A) It will display 0 when the program is executed.
B) It will display 1 when the program is executed.
C) It will display 2 when the program is executed.
D) It will display 3 when the program is executed.
E) None of the above.
A, B, C, D = 0, 0, 0, 0

for D in range( 1, 12, 3 ):
    if D//2*2 == D:
        A += 1
    if D//5*5 == D:
        B += 1
    else:
        C += 1

print( A )    # Line 1
print( B )    # Line 2
print( C )    # Line 3
print( D )    # Line 4

05. Which of the following statements about the Python code labeled "Line 1" in Figure 2 is correct?

A) It will display 0 when the program is executed.
B) It will display 1 when the program is executed.
C) It will display 2 when the program is executed.
D) It will display 3 when the program is executed.
E) None of the above.

06. Which of the following statements about the Python code labeled "Line 2" in Figure 2 is correct?

A) It will display 0 when the program is executed.
B) It will display 1 when the program is executed.
C) It will display 2 when the program is executed.
D) It will display 3 when the program is executed.
E) None of the above.

07. Which of the following statements about the Python code labeled "Line 3" in Figure 2 is correct?

A) It will display 0 when the program is executed.
B) It will display 1 when the program is executed.
C) It will display 2 when the program is executed.
D) It will display 3 when the program is executed.
E) None of the above.

08. Which of the following statements about the Python code labeled "Line 4" in Figure 2 is correct?

A) It will display 10 when the program is executed.
B) It will display 11 when the program is executed.
C) It will display 12 when the program is executed.
D) It will display 13 when the program is executed.
E) None of the above.
A = "And now for something completely different."
B = "And not too expensive!"
C = "An African or European swallow?"

D = A < B
E = B < C

print( D, E )          # Line 1
print( A[5], A[-4] )   # Line 2
print( B[-6:] )        # Line 3
print( C[:7] )         # Line 4

09. What will be displayed by the Python code labeled "Line 1" in Figure 3?
A) False False
B) False True
C) True False
D) True True
E) None of the above.

10. What will be displayed by the Python code labeled "Line 2" in Figure 3?
A) o e
B) n r
C) completely for
D) different. now
E) None of the above.

11. What will be displayed by the Python code labeled "Line 3" in Figure 3?
A) sive!
B) nsive!
C) ot too expensive!
D) not too expensive!
E) None of the above.

12. What will be displayed by the Python code labeled "Line 4" in Figure 3?
A) wallow?
B) swallow?
C) An Afr
D) An Afri
E) None of the above.
def final( P1, P2, P3 ):
    P1[4] = "shrubbery"

    if len(P2) > 3:
        P2 = P2[:3]

    P3.append( "King of the Britons" )

    return " ".join( P2 )

A = "That is no ordinary rabbit".split()
B = "Four shalt thou not count".split()
C = "Arthur".split()
D = final( A, B, C )

print( A )    # Line 1
print( B )    # Line 2
print( C )    # Line 3
print( D )    # Line 4

13. What will be displayed by the Python code labeled "Line 1" in Figure 4?
   A) ‘That is no ordinary shrubbery’
   B) ‘That is no ordinary rabbit’
   C) [‘That’, ‘is’, ‘no’, ‘ordinary’, ‘shrubbery’]
   D) [‘That’, ‘is’, ‘no’, ‘ordinary’, ‘rabbit’]
   E) None of the above.

14. What will be displayed by the Python code labeled "Line 2" in Figure 4?
   A) "Four shalt thou"
   B) "Four shalt thou not count"
   C) [‘Four’, ‘shalt’, ‘thou’]
   D) [‘Four’, ‘shalt’, ‘thou’, ‘not’, ‘count’]
   E) None of the above.

15. What will be displayed by the Python code labeled "Line 3" in Figure 4?
   A) "ArthurKing of the Britons"
   B) "Arthur King of the Britons"
   C) [‘ArthurKing of the Britons’]
   E) None of the above.

16. What will be displayed by the Python code labeled "Line 4" in Figure 4?
   A) "Four shalt thou"
   B) "Four shalt thou not count"
   C) [‘Four’, ‘shalt’, ‘thou’]
   D) [‘Four’, ‘shalt’, ‘thou’, ‘not’, ‘count’]
   E) None of the above.
L = []
M = {}
for c in "Roger the Shrubber":
    L.append( c )
    if c.lower() not in "aeiou":
        if c not in M:
            M[c] = 0
        M[c] += 1

print( len(L), len(M) )  # Line 1
print( M["b"], M["r"] )  # Line 2

S = set()
for c in "eccentric":
    S.add( c )

T = set()
for c in "performance":
    T.add( c )

print( len(S), len(T) )  # Line 3
print( S & T )  # Line 4

17. What will be displayed by the Python code labeled "Line 1" in Figure 5?
   A) 16 7
   B) 16 8
   C) 18 7
   D) 18 8
   E) None of the above.

18. What will be displayed by the Python code labeled "Line 2" in Figure 5?
   A) 2 3
   B) 2 4
   C) 'b': 2 'r': 3
   D) 'b': 2 'r': 4
   E) None of the above.

19. What will be displayed by the Python code labeled "Line 3" in Figure 5?
   A) 6 9
   B) 6 11
   C) 9 9
   D) 9 11
   E) None of the above.

20. What will be displayed by the Python code labeled "Line 4" in Figure 5?
    A) {'t', 'i'}
    B) {'e', 'c', 'n', 'r'}
    C) {'p', 'f', 'o', 'm', 'a'}
    D) {'e', 'c', 'n', 't', 'r', 'i', 'p', 'f', 'o', 'm', 'a'}
    E) None of the above.
21. Consider the information in Figure 6, which is from a session in the Python shell. Which of the following is a valid statement which could be entered as the next shell command?

A) my_length = A.side()
B) print( side(A) )
C) perimeter = A.side * 4
D) All of the above.
E) None of the above.

22. Consider the information in Figure 6, which is from a session in the Python shell. Which of the following is a valid statement which could be entered as the next shell command?

A) print( equal(A,B) )
B) print( A.equal(B) )
C) print( A.equal() == B.equal() )
D) All of the above.
E) None of the above.

23. Consider the information in Figure 6, which is from a session in the Python shell. Which of the following is a valid statement which could be entered as the next shell command?

A) X = A.str()
B) Y = __str__( B )
C) Z = str( A )
D) All of the above.
E) None of the above.
class Fraction( object ):
    def __init__( self, numer=0, denom=1 ):
        self.__numer = 0
        self.__denom = 1
        if type( numer ) == int and type( denom ) == int:
            self.__numer = numer
            self.__denom = denom
            self.__reduce()
    def __str__( self ):
        return str( self.__numer ) + "/" + str( self.__denom )
    def __add__( self, other ):
        if type( other ) != Fraction:
            other = Fraction( other )
        top = (self.__numer * other.__denom) + (self.__denom * other.__numer)
        bottom = self.__denom * other.__denom
        return Fraction( top, bottom )
    def __eq__( self, other ):
        if type( other ) != Fraction:
            other = Fraction( other )
        top1 = self.__numer * other.__denom
        top2 = other.__numer * self.__denom
        return top1 == top2
    def __ne__( self, other ):
        pass
    def __lt__( self, other ):
        if type( other ) != Fraction:
            other = Fraction( other )
        top1 = self.__numer * other.__denom
        top2 = other.__numer * self.__denom
        return top1 < top2
def __gt__( self, other ):
    if type( other ) != Fraction:
        other = Fraction( other )
    return other < self

def __reduce__( self ):
    a, b = self.__numer, self.__denom
    if not a > b:
        a, b = b, a
    while b!=0:
        rem = a%b
        a, b = b, rem
    self.__numer = self.__numer // a
    self.__denom = self.__denom // a
    if (self.__numer < 0 and self.__denom < 0) \ 
    or (self.__numer > 0 and self.__denom < 0):
        self.__numer = -self.__numer
        self.__denom = -self.__denom

###########################################################################
## Figure 7 -- Program
###########################################################################

def main():
    X = Fraction( 4, 8 )
    Y = Fraction( 1, 3 )

    # REPLACE

main()
24. Which of the following statements will generate an exception when it is substituted for the comment "REPLACE" in function "main" in Figure 7?

   A)  A = Fraction( 5 )
   B)  B = Fraction( 3, 0 )
   C)  C = Fraction( 7.5 )
   D)  All of the above.
   E)  None of the above.

25. Which of the following statements will generate an exception when it is substituted for the comment "REPLACE" in function "main" in Figure 7?

   A)  A = X.numer( 3 )
   B)  B = Y.denom()
   C)  C = X.__numer
   D)  All of the above.
   E)  None of the above.

26. Which of the following statements will generate an exception when it is substituted for the comment "REPLACE" in function "main" in Figure 7?

   A)  A = X.reduce()
   B)  B = reduce( Y )
   C)  C = X.__reduce()
   D)  All of the above.
   E)  None of the above.

27. Which of the following statements will generate an exception when it is substituted for the comment "REPLACE" in function "main" in Figure 7?

   A)  A = X + Y
   B)  B = X + 5
   C)  C = 5 + X
   D)  All of the above.
   E)  None of the above.

28. Which of the following statements will generate an exception when it is substituted for the comment "REPLACE" in function "main" in Figure 7?

   A)  A = X == Y
   B)  B = X == 5
   C)  C = 5 == X
   D)  All of the above.
   E)  None of the above.

29. Which of the following statements will generate an exception when it is substituted for the comment "REPLACE" in function "main" in Figure 7?

   A)  A = X < Y
   B)  B = X < 5
   C)  C = 5 < X
   D)  All of the above.
   E)  None of the above.

30. Which of the following is a correct replacement for the "pass" statement in method "__ne__" in Figure 7?

   A)  return not self == other
   B)  return self.__numer != other.__numer
   C)  return self != other
   D)  All of the above.
   E)  None of the above.
# Figure 8 -- Classes

class Thing( object ):
    def __init__( self, value ):
        self.value = value
    def __str__( self ):
        return str( self.value )
    def add( self, n ):
        self.value = self.value + n
    def sub( self, n ):
        self.value = self.value - n
    def mul( self, n ):
        self.value = self.value * n

class Gadget( Thing ):
    def add( self, n ):
        self.value = self.value + (2*n)
    def sub( self, n ):
        self.value = self.value - (2*n)
        Thing.mul( self, n )
    def mul( self, n ):
        self.value = self.value * (2*n)

class Gizmo( Thing ):
    def add( self, n ):
        Thing.mul( self, n )
        self.value = self.value + (4*n)
    def sub( self, n ):
        self.value = self.value - (4*n)
    def div( self, n ):
        self.value = self.value / (4*n)
A = Gadget( 20 ) # Line 1
A.add( 2 )      # Line 2
print( A )      # Line 2

B = Gadget( 20 )
B.sub( 3 )      # Line 3
print( B )      # Line 4

C = Gizmo( 30 )
C.add( 4 )      # Line 5
print( C )      # Line 6

D = Gizmo( 30 )
D.mul( 5 )      # Line 7
print( D )      # Line 8

E = Thing( 40 )
E.sub( 6 )      # Line 9
print( E )      # Line 10

F = Thing( 40 )
F.div( 8 )      # Line 11
print( F )      # Line 12
Questions 31 through 36 refer to the Python code in Figure 8 (previous page).

31. Which of the following statements is correct?

   A) Line 1 is not valid.
   B) Line 2 will display 22 when it is executed.
   C) Line 2 will display 24 when it is executed.
   D) Line 2 will display 25 when it is executed.
   E) None of the above.

32. Which of the following statements is correct?

   A) Line 3 is not valid.
   B) Line 4 will display 14 when it is executed.
   C) Line 4 will display 42 when it is executed.
   D) Line 4 will display 90 when it is executed.
   E) None of the above.

33. Which of the following statements is correct?

   A) Line 5 is not valid.
   B) Line 6 will display 38 when it is executed.
   C) Line 6 will display 120 when it is executed.
   D) Line 6 will display 136 when it is executed.
   E) None of the above.

34. Which of the following statements is correct?

   A) Line 7 is not valid.
   B) Line 8 will display 150 when it is executed.
   C) Line 8 will display 300 when it is executed.
   D) Line 8 will display 600 when it is executed.
   E) None of the above.

35. Which of the following statements is correct?

   A) Line 9 is not valid.
   B) Line 10 will display 16 when it is executed.
   C) Line 10 will display 28 when it is executed.
   D) Line 10 will display 34 when it is executed.
   E) None of the above.

36. Which of the following statements is correct?

   A) Line 11 is not valid.
   B) Line 12 will display 0.8 when it is executed.
   C) Line 12 will display 1 when it is executed.
   D) Line 12 will display 1.25 when it is executed.
   E) None of the above.
def divide( X, Y ):  
    try:  
        return X // Y  
    except TypeError:  
        return 1  

def process( A=0, B=0 ):  
    V, Z = (0, 0)  
    try:  
        A = int( A )  
        Z = 5 + divide( A, B )  
    except ValueError:  
        V += 1  
    except ZeroDivisionError:  
        V += 2  
    except:  
        V += 4  
    else:  
        V += 8  
    return (V, Z)  

print( process( 7.25 ) )        # Line 1  
print( process( 11.5, 4 ) )     # Line 2  
print( process( 3, "call" ) )   # Line 3  
print( process( "call", 4 ) )   # Line 4
Questions 37 through 40 refer to the Python code in Figure 9 (previous page).

37. Which of the following statements about the Python code labeled "Line 1" in Figure 9 is correct?
   
   A) It will display (1, 0) when the program is executed.
   B) It will display (2, 0) when the program is executed.
   C) It will display (8, 6) when the program is executed.
   D) It will display (8, 7) when the program is executed.
   E) None of the above.

38. Which of the following statements about the Python code labeled "Line 2" in Figure 9 is correct?

   A) It will display (1, 0) when the program is executed.
   B) It will display (2, 0) when the program is executed.
   C) It will display (8, 6) when the program is executed.
   D) It will display (8, 7) when the program is executed.
   E) None of the above.

39. Which of the following statements about the Python code labeled "Line 3" in Figure 9 is correct?

   A) It will display (1, 0) when the program is executed.
   B) It will display (2, 0) when the program is executed.
   C) It will display (8, 6) when the program is executed.
   D) It will display (8, 7) when the program is executed.
   E) None of the above.

40. Which of the following statements about the Python code labeled "Line 4" in Figure 9 is correct?

   A) It will display (1, 0) when the program is executed.
   B) It will display (2, 0) when the program is executed.
   C) It will display (8, 6) when the program is executed.
   D) It will display (8, 7) when the program is executed.
   E) None of the above.