

QB1

Big Oh (simple)

Do NOT write on this test. Record all answers on the bubble sheet. **Closed book. No notes.** Work strictly from memory. No time limit. **No calculators. Scratch paper okay.**

- 1/2p. Give a tight big-oh $\Theta()$ bound on the running time $T(n)$ of this program.
Assume `atoi`, `simpleStatement`, and `simpleCompare` each run in $\Theta(1)$ time.
(A) n^9 (C) n^7 (E) n^5 (G) n^3 (I) n
(B) n^8 (D) n^6 (F) n^4 (H) n^2 (J) 1

```
int main ( int argc, char * * argv ) {
    int n = atoi(argv[1]);
    if ( simpleCompare ) {
        f = n; while ( f > 1 ) {
            if ( simpleCompare ) {
                for ( a = n ; a > 1 ; a -= 10 ) {
                    c = 1; while ( c < n ) {
                        for ( j = 1 ; j < n ; j += 3 ) {
                            k = 1; while ( k < n ) {
                                simpleStatement;
                                k++; }
                            }
                        c += 2; }
                    }
                f -= 3; }
            }
        return 0; }
```

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- 2/2p. Give a tight big-oh $\Theta()$ bound on the running time $T(n)$ of this program.
Assume `atoi`, `simpleStatement`, and `simpleCompare` each run in $\Theta(1)$ time.
(A) n^9 (C) n^7 (E) n^5 (G) n^3 (I) n
(B) n^8 (D) n^6 (F) n^4 (H) n^2 (J) 1

```
int main ( int argc, char * * argv ) {
    int n = atoi(argv[1]);
    if ( simpleCompare ) {
        if ( simpleCompare ) {
            for ( a = 1 ; a < n ; a++ ) {
                simpleStatement;
            }
        } else {
            simpleStatement;
        }
    } else {
        j = n; while ( j > 1 ) {
            simpleStatement;
            j--; }
    }
    return 0; }
```

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- 3/2p. Give a tight big-oh $\Theta()$ bound on the running time $T(n)$ of this program.
Assume `atoi`, `simpleStatement`, and `simpleCompare` each run in $\Theta(1)$ time.
(A) n^9 (C) n^7 (E) n^5 (G) n^3 (I) n
(B) n^8 (D) n^6 (F) n^4 (H) n^2 (J) 1

```
int main ( int argc, char * * argv ) {
    int n = atoi(argv[1]);
    if ( simpleCompare ) {
        if ( simpleCompare ) {
            if ( simpleCompare ) {
                if ( simpleCompare ) {
                    simpleStatement;
                }
            } else {
                simpleStatement;
            }
        } else {
            simpleStatement;
        }
    } else {
        for ( h = n ; h > 1 ; h -= 5 ) {
            d = 1; do {
                simpleStatement;
                d += 1; } while ( d < n );
        }
    }
    } else {
        for ( e = n ; e > 1 ; e-- ) {
            if ( simpleCompare ) {
                if ( simpleCompare ) {
                    k = n; while ( k > 1 ) {
                        simpleStatement;
                        k--; }
                }
            } else {
                c = 1; while ( c < n ) {
                    simpleStatement;
                    c += 2; }
            }
        }
    }
    return 0; }
```

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- 4/2p. Give a tight big-oh $\Theta()$ bound on the running time $T(n)$ of this program.
Assume `atoi`, `simpleStatement`, and `simpleCompare` each run in $\Theta(1)$ time.
(A) n^9 (C) n^7 (E) n^5 (G) n^3 (I) n
(B) n^8 (D) n^6 (F) n^4 (H) n^2 (J) 1

```
int main ( int argc, char * * argv ) {
    int n = atoi(argv[1]);
    if ( simpleCompare ) {
        d = n; while ( d > 1 ) {
            for ( c = 1 ; c < n ; c += 5 ) {
                if ( simpleCompare ) {
                    if ( simpleCompare ) {
                        for ( i = n ; i > 1 ; i-- ) {
                            a = 1; while ( a < n ) {
                                for ( k = n ; k > 1 ; k -= 2 ) {
                                    if ( simpleCompare ) {
                                        simpleStatement;
                                    } else {
                                        simpleStatement;
                                    }
                                }
                            }
                            a += 1; }
                        }
                    }
                }
            }
        }
        d--; }
    } else {
        if ( simpleCompare ) {
            if ( simpleCompare ) {
                if ( simpleCompare ) {
                    h = n; while ( h > 1 ) {
                        simpleStatement;
                        h -= 10; }
                    } else {
                        simpleStatement;
                    }
                }
            } else {
                f = n; while ( f > 1 ) {
                    if ( simpleCompare ) {
                        simpleStatement;
                    }
                    f -= 10; }
                }
            }
        }
    return 0; }
```

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5/2p. Give a tight big-oh $\Theta()$ bound on the running time $T(n)$ of this program.
Assume `atoi`, `simpleStatement`, and `simpleCompare` each run in $\Theta(1)$ time.

- (A) n^9 (C) n^7 (E) n^5 (G) n^3 (I) n
(B) n^8 (D) n^6 (F) n^4 (H) n^2 (J) 1

```
int main ( int argc, char * * argv ) {
    int n = atoi(argv[1]);
    if ( simpleCompare ) {
        h = 1; do {
            for ( b = 1 ; b < n ; b += 3 ) {
                if ( simpleCompare ) {
                    if ( simpleCompare ) {
                        if ( simpleCompare ) {
                            simpleStatement;
                        } else {
                            simpleStatement;
                        }
                    } else {
                        simpleStatement;
                    }
                } else {
                    if ( simpleCompare ) {
                        simpleStatement;
                    } else {
                        simpleStatement;
                    }
                }
            }
        } while ( h < n );
    } else {
        if ( simpleCompare ) {
            if ( simpleCompare ) {
                if ( simpleCompare ) {
                    for ( i = n ; i > 1 ; i-- ) {
                        simpleStatement;
                    }
                }
            }
        }
    }
    return 0; }
```

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Bro Colton

CS 201 Big Oh (simple)

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Total points 10.

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Answer Key (points per line)

1	(2).	E	(n^5)
2	(2).	I	(n)
3	(2).	H	(n^2)
4	(2).	E	(n^5)
5	(2).	H	(n^2)

Total points 10.