

ICS H23—Spring 2008
Honors Introduction to Computer Science III
Homework 2 Answers

1. ABDEFC, ACDEFB, ACEFDB.
2. a) We write a version of DFS that takes an additional parameter c , giving the color we want to assign to v . Let the two available colors be 1 and 2. Then if c is a color, $3 - c$ gives the other color.

```
void DFS( $v,c$ )
{
    visited( $v$ ) = true;
    color( $v$ ) =  $c$ ;
    for (each  $w$  such that  $v$  is adjacent to  $w$ ) {
        if (!visited( $w$ )) DFS( $w, 3 - c$ );
        else if (color( $w$ ) == color( $v$ ))
            twoColorable = false;
    }
}
```

The following code initializes `visited` to **false** and `twoColorable` to **true**, and then makes sure that DFS is called for all $v \in V$. Afterwards `twoColorable` will be **false** if and only if some violation (two adjacent vertices with the same color) was found.

```
for (each  $v \in V$ )
    visited( $v$ ) = false;
twoColorable = true;
for (each  $v \in V$ )
    if (!visited( $v$ )) DFS( $v,1$ );
```

- b) A graph fails to be two-colorable if and only if it has a cycle of odd length.

3. Edge	Earliest	Latest
(a, b)	0	1
(a, c)	0	0
(b, d)	4	5
(c, d)	3	3
(d, e)	8	8
(d, f)	8	11
(e, g)	11	11
(f, g)	11	14