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Homework #3

1.) Tail recursion

a.) Rewrite as tail recursive functions:

```
public static int f (int x) {
        return f(x,0);
}

public static int g (int x) {
    return g(x,0);
}

public static int f (int x, int acc) {
        if (x == 0)
                return acc;
    return g(x - 1, 1 + acc);
}

public static int g (int x, int acc) {
        if (x == 0)
                return acc;
        return f(x - 1, 2 + acc);
}
```

b.) Rewrite as iterative

```
public static int fg_iter (int x){
        int accu = 0;
    while (x != 0){
     accu += 2;
     x-=1;
     accu += 1;
     x-=1;
    }
    return accu;
}
```

2.) Memory allocation

a.) First fit

Block entries:

50 | 20 | 100 | 50 | 30 | 60 |

Final Allocation:

20 20 | | 30 50 | 50 | | 45 |

Free list steps:

30, 20, 100, 50, 30, 60 (20 gets allocated)
10, 20, 100, 50, 30, 60 (20 gets allocated)
10, 20, 70, 50, 30, 60 (30 gets allocated)
10, 20, 20, 50, 30, 60 (50 gets allocated)
10, 20, 20, 0, 30, 60 (50 gets allocated)
Final free list: 10, 20, 20, 0, 30, 15 (45 gets allocated)

b.) Best fit

Block entries:

50 | 20 | 100 | 50 | 30 | 60 |

Final Allocation:

30 | 20 | 45 | 50 | 20 | 50 |

Free list steps:

50, 0, 100, 50, 30, 60 (20 gets allocated)
50, 0, 100, 50, 10, 60 (20 gets allocated)
20, 0, 100, 50, 10, 60 (30 gets allocated)
20, 0, 100, 0, 10, 60 (50 gets allocated)
20, 0, 100, 0, 10, 10 (50 gets allocated)
Final free list: 20, 0, 55, 0, 10, 10 (45 gets allocated)

c.) Worst fit

Block entries:

50 | 20 | 100 | 50 | 30 | 60 |

Final Allocation:

50 | | 20 20 30 | 45 | | 50 |

Free list steps:

50 20 80 50 30 60 (20 gets allocated)
50 20 60 50 30 60 (20 gets allocated)
50 20 30 50 30 60 (30 gets allocated)
50 20 30 50 30 10 (50 gets allocated)
0 20 30 50 30 10 (50 gets allocated)
Final free list: 0 20 30 5 30 10 (50 gets allocated)

d.) They will all be able to satisfy the request