

**Exam #4**

This is an open-book, open notes exam. Show your work, so you can receive credit for correct parts of the final molecule.

1. (20 points)  $C_9H_{12}O$

**$^{13}C$  NMR**

156.9, s  
130.8, s (2)  
128.8, d (2)  
123.7, d  
59.5, q  
16.0, q (2)

**$^1H$  NMR**

7.00, d,  $J = 8.0$  Hz, 2H  
6.85, t,  $J = 8.0$  Hz, 1H  
3.70, s, 3H  
2.28, s, 6H

2. (40 points)  $C_{10}H_{18}O$

IR:  $1735\text{ cm}^{-1}$   
MS: 170, 113

**$^{13}C$  NMR**

175.7, s  
80.5, d  
36.1, t  
34.9, t  
34.6, t  
28.3, t  
27.6, t  
23.1, t  
22.5, t  
13.9, q

**$^1H$  NMR**

4.25, m, 1H  
2.65, m, 2H  
1.3 -1.9, m, 12H  
0.92, t,  $J = 7.2$  Hz, 3H

3. (40 points)  $C_{14}H_{22}O$

**$^{13}C$  NMR**

152.7, s  
142.4, s  
127.2, d (2)  
114.5, d (2)  
59.4, t  
37.9, s  
32.2, s  
31.7, q (2)  
31.6, q (3)

**$^1H$  NMR**

7.22, d,  $J = 7.9$  Hz, 2H  
6.75, d,  $J = 7.9$  Hz, 2H  
5.25, bs, 1H (exchanges)  
1.71, s, 2H  
1.33, s, 6H  
0.72, s, 9H