

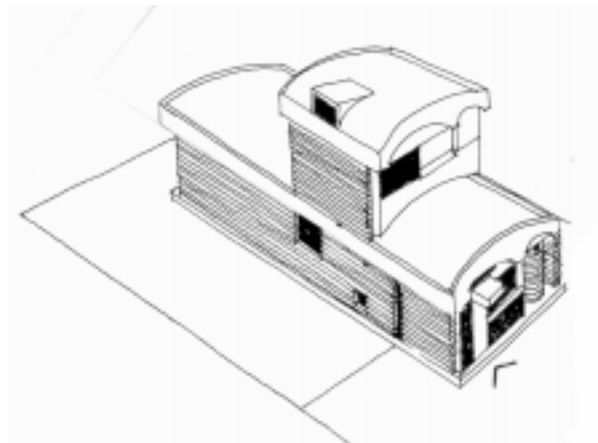
Arch 463  
ECS  
Fall 2001

Name \_\_\_\_\_

Quiz #2

"Positively B Street"

For this problem you are the designer and solar energy expert for a 21 year-old, Corbu-loving graphic designer. Your client wants you to recreate an environmentally-friendly, one-story version of le Corbusier's Jaoul House B as a garden house/studio in his parents' garden in Eugene, OR. You will suggest the proper siting and orientation of House B. You will also remodel the first floor (in keeping with Corbu's intent) to contain a bedroom and bathroom. You will be asked to design a shading strategy for the garden elevation of House B.



Drawings (except napkin) from Le Corbusier: An Analysis of Form by Geoffrey Baker

House B axonometric showing entry and small second-story studio with clerestory.

**Climate Context.** Eugene is located at 44° north latitude. It has a warm dry summer climate with mild cloudy winters. Prevailing winds blow from the north in the summer and from the south in the winter. Winds are strongest during daylight hours, averaging 7 to 12 m.p.h..

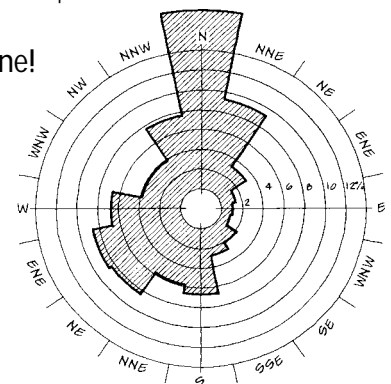
Read all of the questions before you start answering the first one!

|         | J   | F   | M   | A   | M   | J   | J   | A   | S   | O   | N   | D   |
|---------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1 am    | 7.6 | 7.7 | 6.5 | 6.0 | 6.9 | 4.8 | 2.3 | 2.6 | 3.7 | 5.0 | 8.2 | 8.5 |
| 2       | 7.8 | 8.2 | 6.5 | 6.4 | 7.1 | 5.0 | 2.7 | 2.7 | 3.8 | 4.8 | 8.0 | 8.5 |
| 3       | 8.0 | 8.3 | 6.6 | 6.5 | 7.3 | 5.3 | 3.2 | 3.0 | 4.0 | 5.1 | 8.0 | 8.5 |
| 4       | 8.2 | 8.9 | 6.6 | 6.6 | 7.5 | 5.4 | 3.6 | 3.1 | 4.2 | 5.8 | 7.9 | 8.5 |
| 5       | 8.7 | 8.8 | 6.9 | 6.7 | 7.8 | 5.7 | 4.1 | 3.4 | 4.5 | 6.0 | 8.2 | 8.6 |
| 6       | 9.0 | 8.8 | 7.1 | 7.6 | 8.1 | 6.0 | 4.6 | 3.6 | 4.9 | 6.5 | 8.6 | 8.4 |
| 7       | 9.5 | 9.2 | 7.4 | 7.6 | 8.5 | 6.3 | 5.0 | 3.9 | 5.2 | 7.1 | 9.1 | 8.4 |
| 8       | 9.5 | 9.3 | 7.6 | 7.5 | 8.3 | 6.5 | 5.1 | 4.2 | 5.3 | 6.8 | 9.2 | 8.7 |
| 9       | 9.6 | 9.2 | 8.0 | 7.7 | 7.9 | 6.4 | 5.1 | 3.9 | 5.3 | 6.7 | 9.3 | 9.1 |
| 10      | 9.6 | 9.2 | 8.3 | 7.8 | 7.7 | 6.4 | 5.2 | 4.0 | 5.3 | 6.9 | 9.5 | 9.4 |
| 11 am   | 9.3 | 9.1 | 7.9 | 7.9 | 7.4 | 6.3 | 5.2 | 4.5 | 5.1 | 6.7 | 9.4 | 9.3 |
| 12 noon | 9.0 | 8.9 | 7.6 | 7.9 | 7.1 | 6.0 | 5.0 | 5.0 | 4.9 | 5.7 | 9.3 | 8.1 |
| 1 pm    | 8.7 | 8.9 | 7.3 | 7.7 | 6.8 | 5.9 | 5.0 | 5.5 | 4.7 | 5.8 | 9.3 | 8.9 |
| 2       | 8.8 | 9.0 | 7.3 | 7.6 | 6.6 | 5.9 | 4.7 | 5.3 | 4.5 | 5.3 | 9.1 | 8.8 |
| 3       | 8.8 | 8.8 | 7.2 | 7.7 | 6.4 | 5.8 | 4.3 | 5.1 | 4.4 | 5.2 | 9.1 | 8.8 |
| 4       | 8.9 | 8.6 | 7.2 | 7.4 | 6.1 | 5.8 | 4.0 | 4.9 | 4.2 | 5.3 | 9.0 | 8.6 |
| 5       | 8.7 | 8.8 | 7.3 | 7.4 | 6.3 | 5.3 | 4.2 | 4.5 | 4.1 | 5.7 | 9.0 | 8.6 |
| 6       | 8.5 | 8.9 | 7.4 | 7.0 | 6.4 | 5.0 | 4.3 | 4.2 | 4.0 | 5.3 | 8.9 | 8.6 |
| 7       | 8.3 | 8.4 | 7.4 | 6.8 | 6.6 | 4.5 | 4.6 | 3.8 | 3.9 | 5.4 | 8.9 | 8.6 |
| 8       | 8.1 | 8.3 | 7.1 | 6.3 | 6.4 | 4.5 | 4.2 | 3.4 | 3.8 | 5.4 | 8.8 | 8.5 |
| 9       | 7.9 | 8.5 | 7.0 | 6.5 | 6.1 | 4.3 | 3.6 | 3.0 | 3.8 | 4.9 | 8.7 | 8.5 |
| 10      | 7.7 | 8.1 | 6.7 | 6.3 | 5.9 | 4.4 | 3.2 | 2.6 | 3.7 | 5.0 | 8.6 | 8.5 |
| 11 pm   | 7.7 | 7.8 | 6.7 | 6.1 | 6.3 | 4.5 | 2.9 | 2.6 | 3.8 | 5.1 | 8.4 | 8.4 |
| 12 mid  | 7.7 | 7.8 | 6.6 | 5.7 | 6.5 | 4.4 | 2.5 | 2.5 | 3.7 | 5.1 | 8.4 | 8.5 |

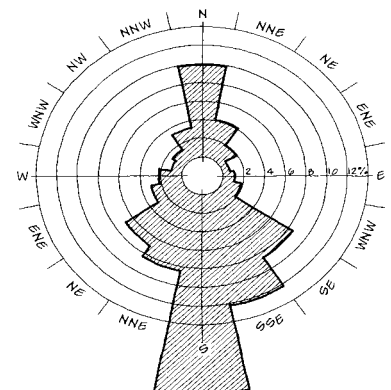


Mean Hourly Sky Cover, tenths of sky covered

Sun, Wind & Light, 2nd ed. ©2001 Mark DeKay



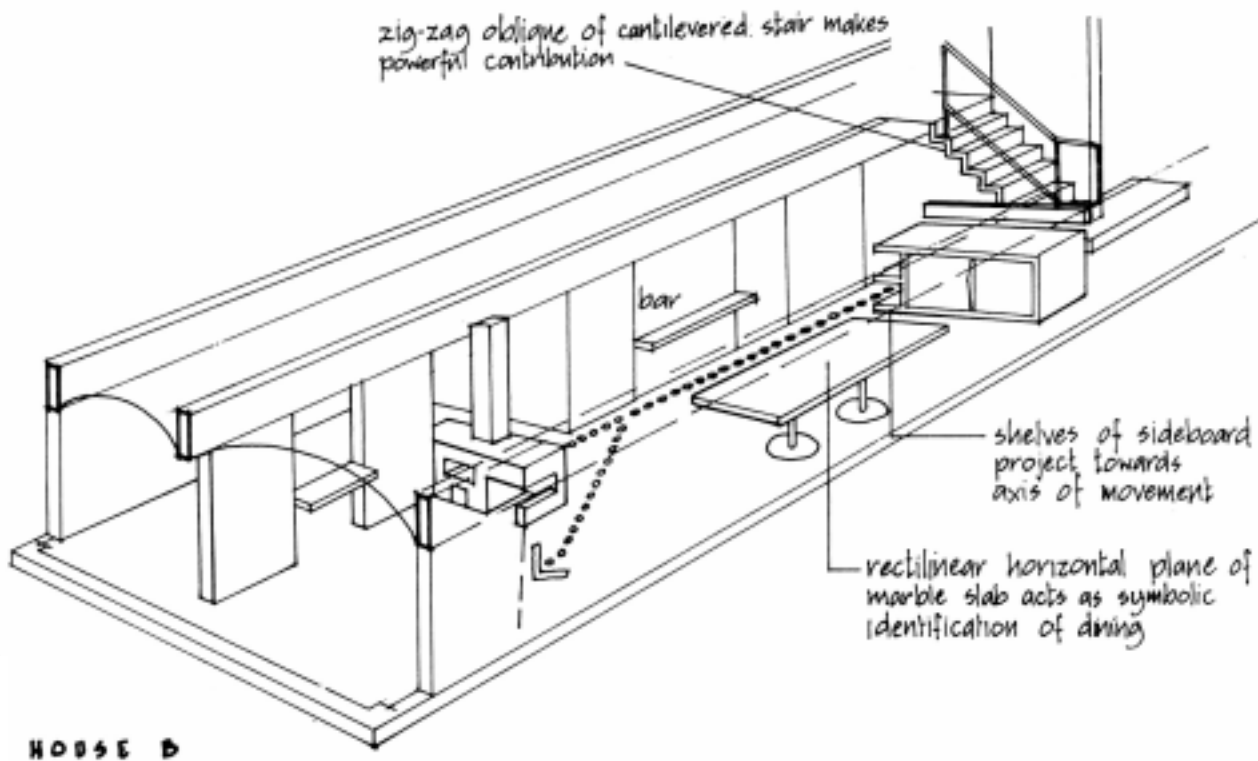
June Wind Rose, Eugene  
Sun, Wind & Light, 2nd ed. ©2001 Mark DeKay



December Wind Rose, Eugene  
Sun, Wind & Light, 2nd ed. ©2001 Mark DeKay

|     | Temperature (° F) |     |     |         |     | Rel Humidity |      | Wind (kts) |     |     | Sky<br>Cvr |
|-----|-------------------|-----|-----|---------|-----|--------------|------|------------|-----|-----|------------|
|     | means             |     |     | extreme |     | (percent)    |      | prevail    |     | max |            |
|     | max               | min | ave | max     | min | 6 am         | 3 pm | dir        | spd | gst |            |
| Jan | 46                | 33  | 40  | 67      | -4  | 91           | 80   | S          | 9   | 57  | OVR        |
| Feb | 51                | 35  | 43  | 72      | -3  | 92           | 72   | S          | 9   | 46  | OVR        |
| Mar | 56                | 37  | 46  | 77      | 20  | 91           | 64   | S          | 9   | 52  | OVR        |
| Apr | 61                | 39  | 50  | 86      | 27  | 88           | 58   | S          | 8   | 50  | OVR        |
| May | 67                | 43  | 56  | 93      | 28  | 84           | 54   | N          | 8   | 44  | OVR        |
| Jun | 74                | 48  | 61  | 102     | 32  | 81           | 49   | N          | 9   | 36  | OVR        |
| Jul | 82                | 51  | 67  | 105     | 39  | 78           | 38   | N          | 9   | 44  | CLR        |
| Aug | 82                | 51  | 67  | 108     | 38  | 82           | 39   | N          | 9   | 34  | CLR        |
| Sep | 77                | 48  | 62  | 103     | 32  | 89           | 44   | N          | 9   | 31  | CLR        |
| Oct | 64                | 42  | 53  | 94      | 19  | 94           | 61   | S          | 7   | 37  | OVR        |
| Nov | 53                | 38  | 45  | 76      | 12  | 93           | 79   | S          | 9   | 50  | OVR        |
| Dec | 47                | 35  | 41  | 68      | -12 | 92           | 84   | S          | 9   | 53  | OVR        |
| Ann | 63                | 42  | 53  | 108     | -12 | 88           | 60   | N          | 9   | 57  | OVR        |

*Climatic Normals, 1945-1990*  
Eugene, Or.

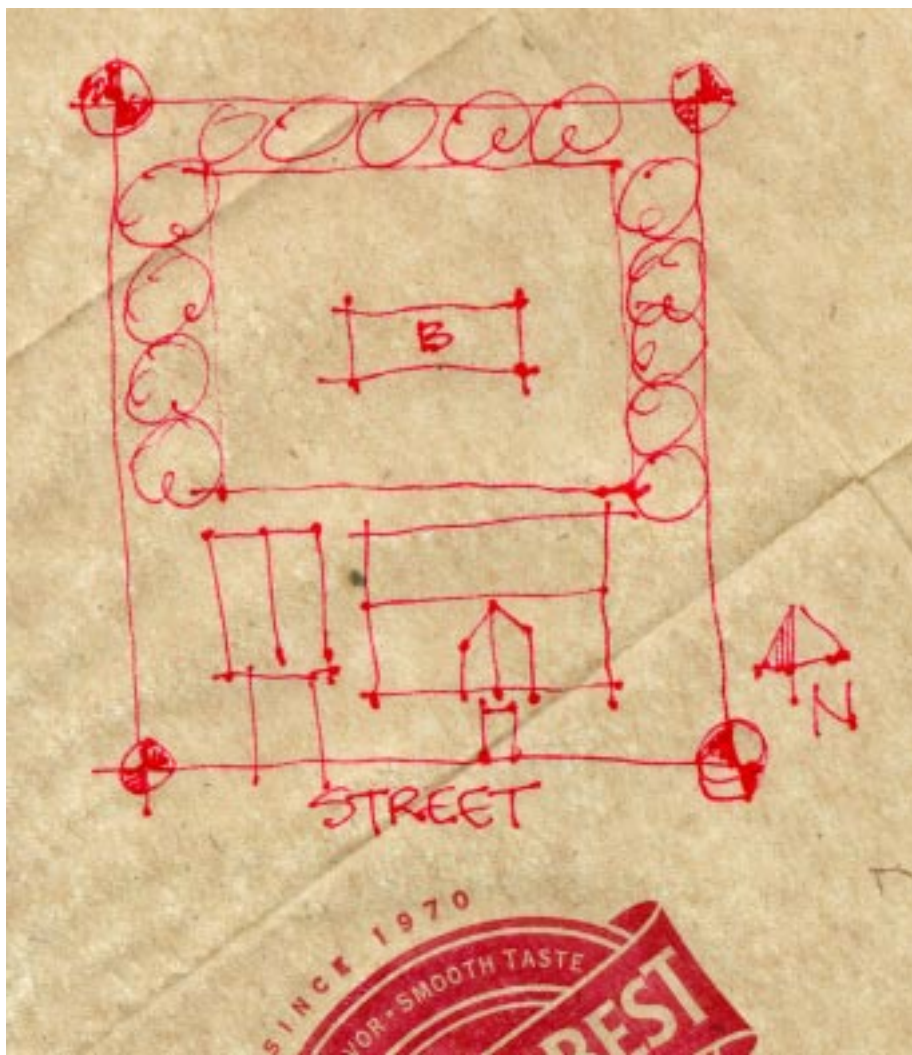


*Interior axonometric of House B from the living room toward the kitchen.*

3 points

### 1. Siting

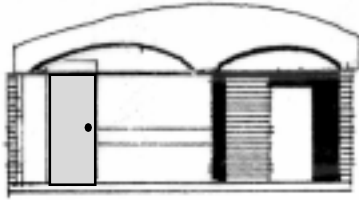
Your client has given you a napkin sketch of the site and his idea for siting House B. The site is in the middle of the block and basically level. The backyard garden is surrounded by 20' to 30' fruit trees on three sides and separated from B Street by the parents' house and garage. Remember that your client wants to optimize architectural heating and cooling for the house. **Indicate** the best solar site and orientation in the garden for House B. **Explain** why your choice is better than your client's proposed siting. **Annotate** the napkin sketch to make your design intentions and argument clear.



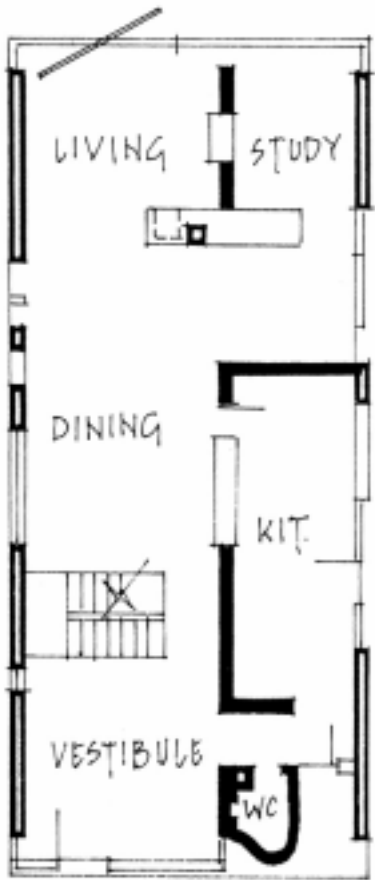
3 points

## 2. Remodeling

Your client wants to have a bedroom and a bathroom inserted into the fabric of the first floor plan (the stairs lead to a small studio above) while keeping the spirit of Corbu's original design. He's especially fond of the pivoting door in the living room. **Indicate** on the plan below how you would remodel the first floor to accommodate the new functions while optimizing the building's passive heating and cooling performance. **Explain** why your proposal is appropriate architecturally and thermally.



ENTRY ELEVATION



main entry secondary

GROUND PLAN

4 points

### 3. Fenestration

Design the fenestration for the garden elevation of the new House B. **Show** your design on the axonometric below. **Specify** a.) in-fill brick panels, b.) windows, c.) French doors and d.) external shading devices as outer skin elements of the house. **Explain** your choice(s) and their roles in passive heating and cooling.

