# Collision Detection Using SDFs

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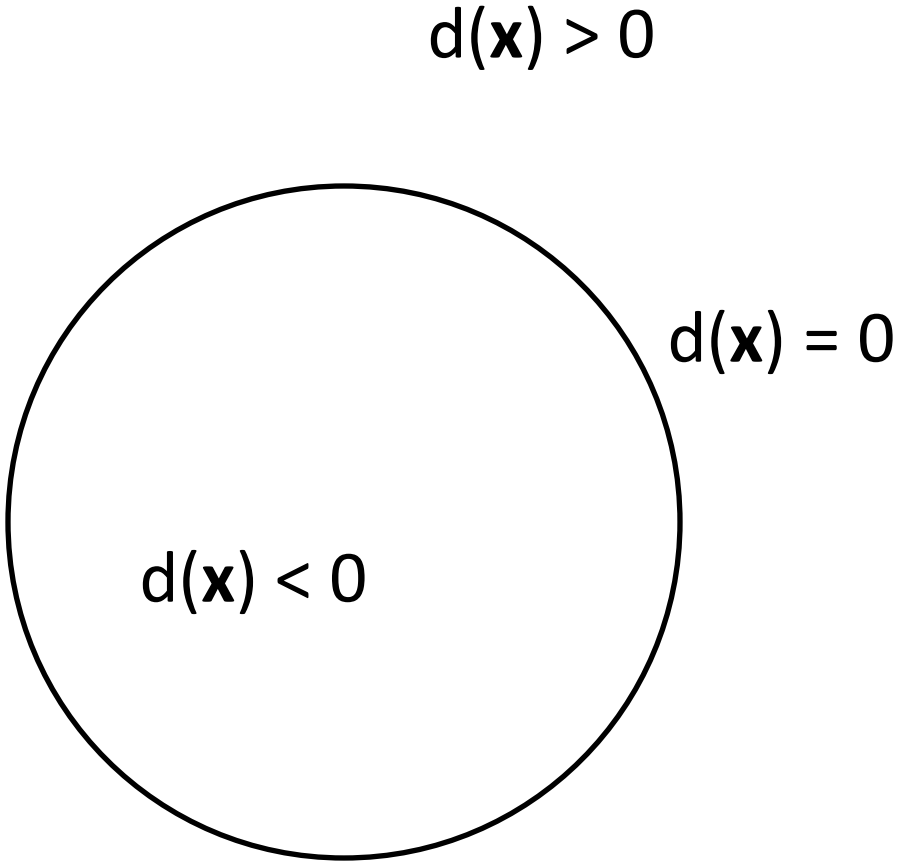
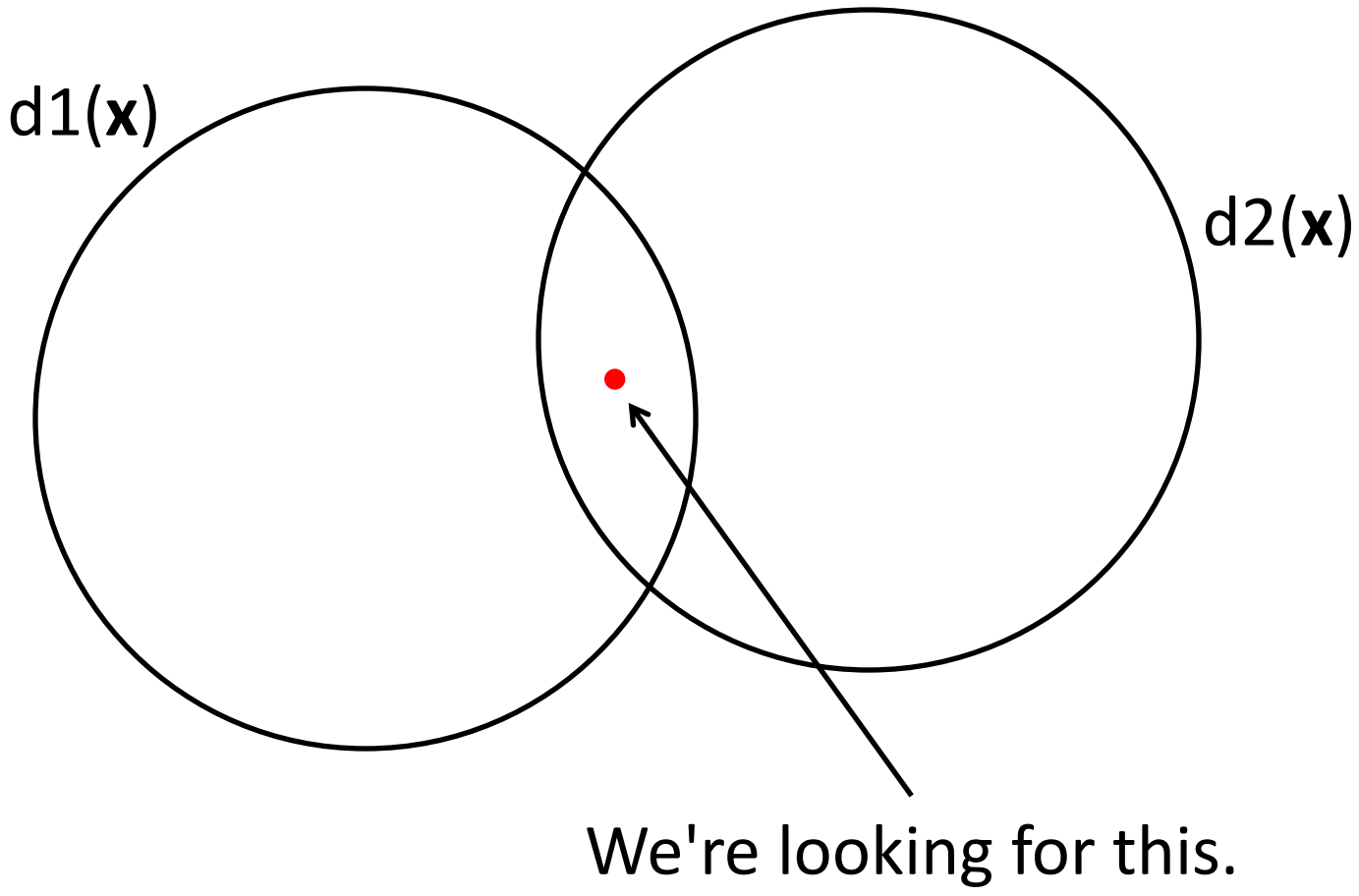
12/7/10

# Signed Distance Functions (SDF)

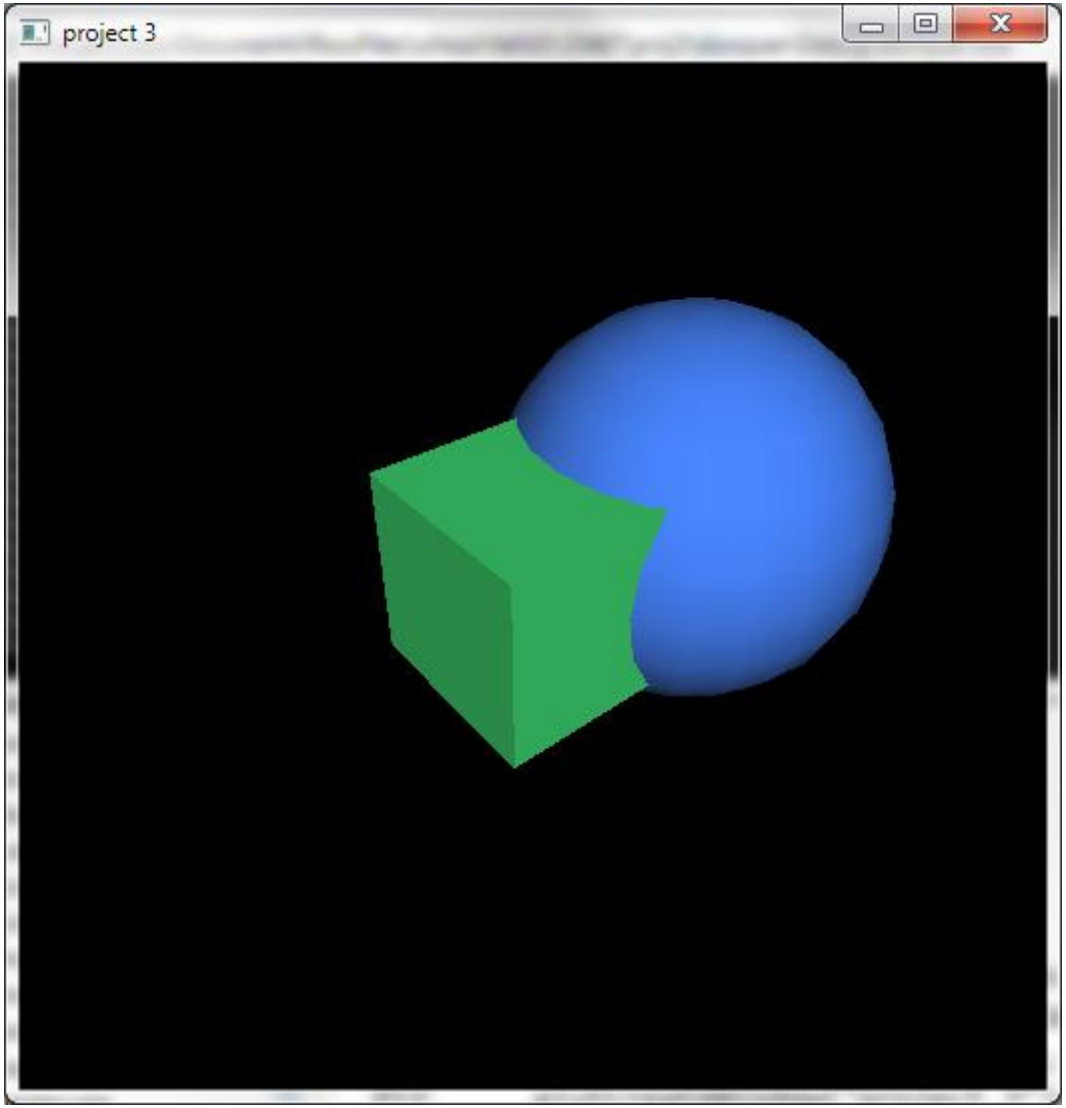


# Collision Detection



# Slow Version

1. Construct the smallest box possible that contains both bodies.
2. Calculate max(d1, d2) at the center of the box, where d1 and d2 are the SDFs of the bodies.
3. Is the value greater than the size of the box?
   a. Yes? There's no way the bodies are colliding in the box. Stop.
   b. No? Keep going.
4. Divide the box into eight smaller, equally sized ones.
5. Repeat (2) - (4) for each of those boxes.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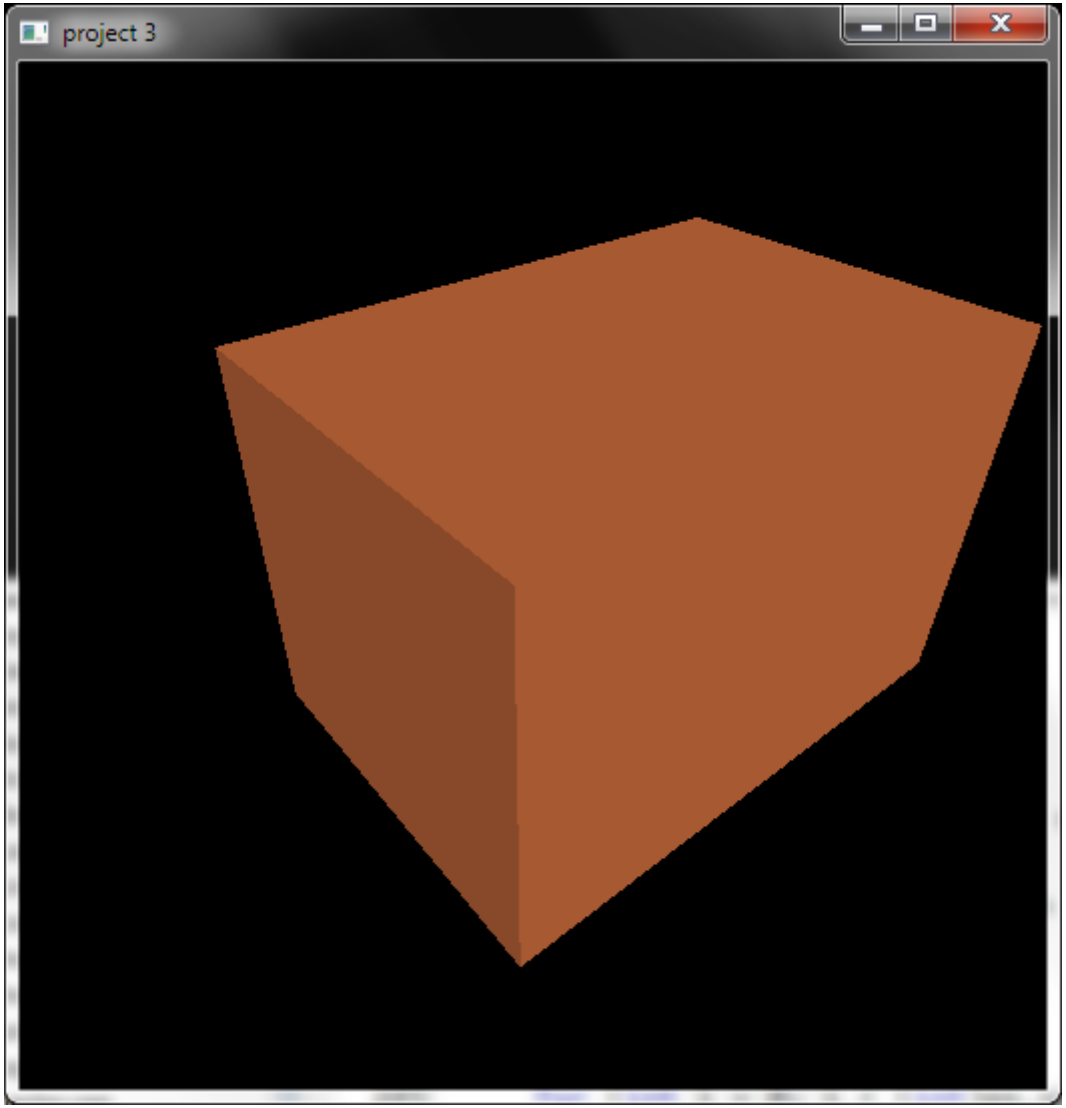
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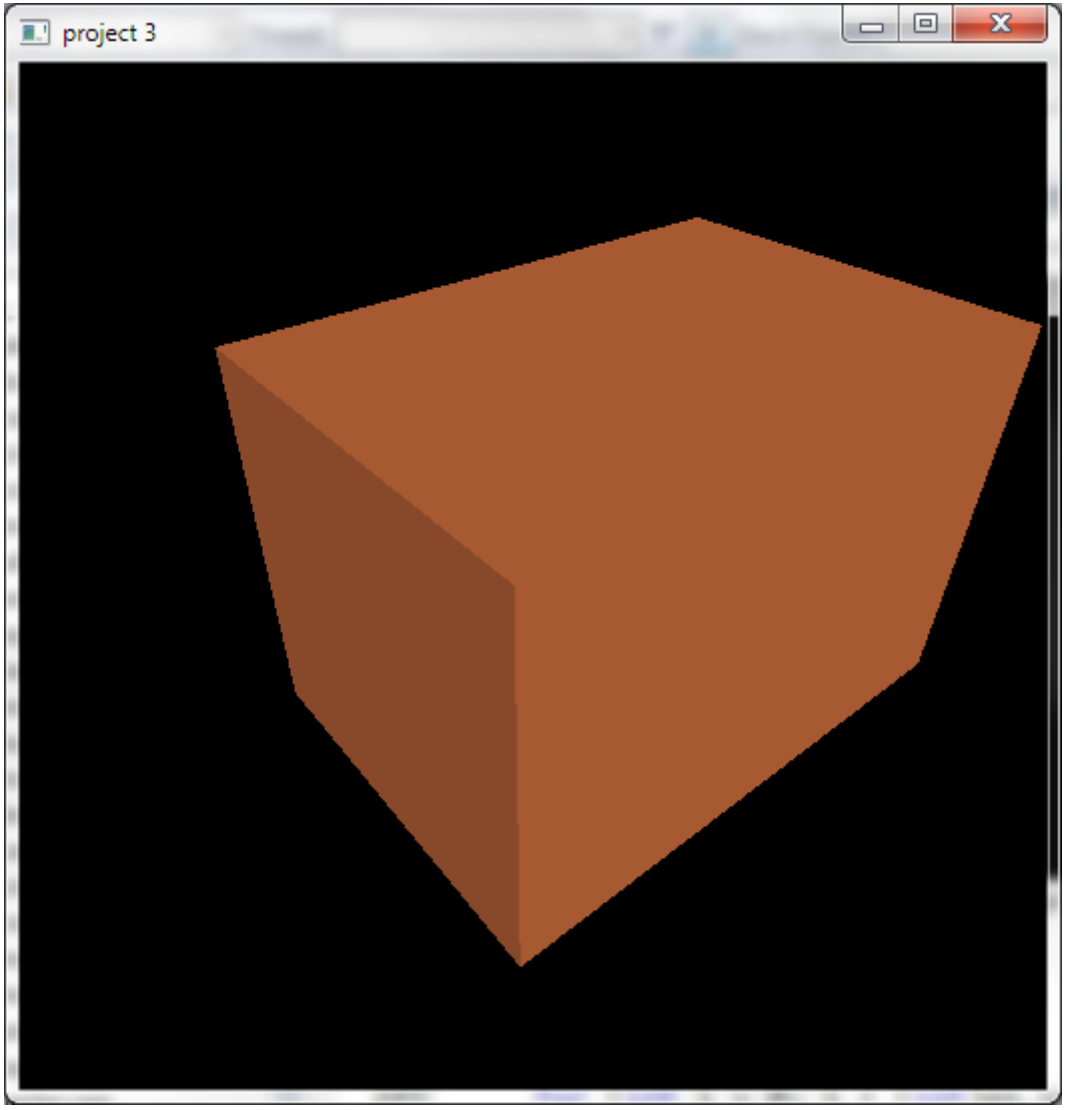
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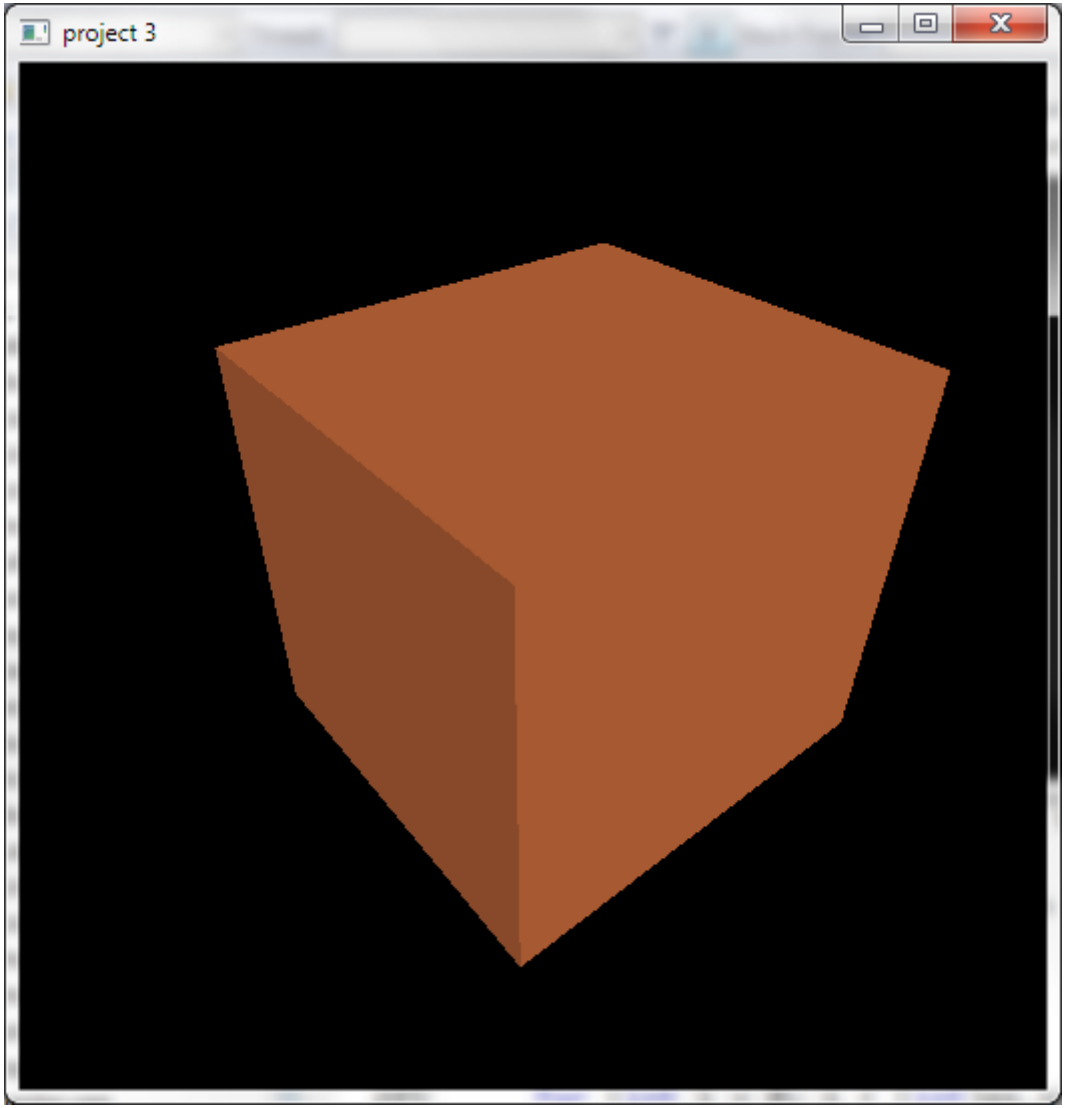
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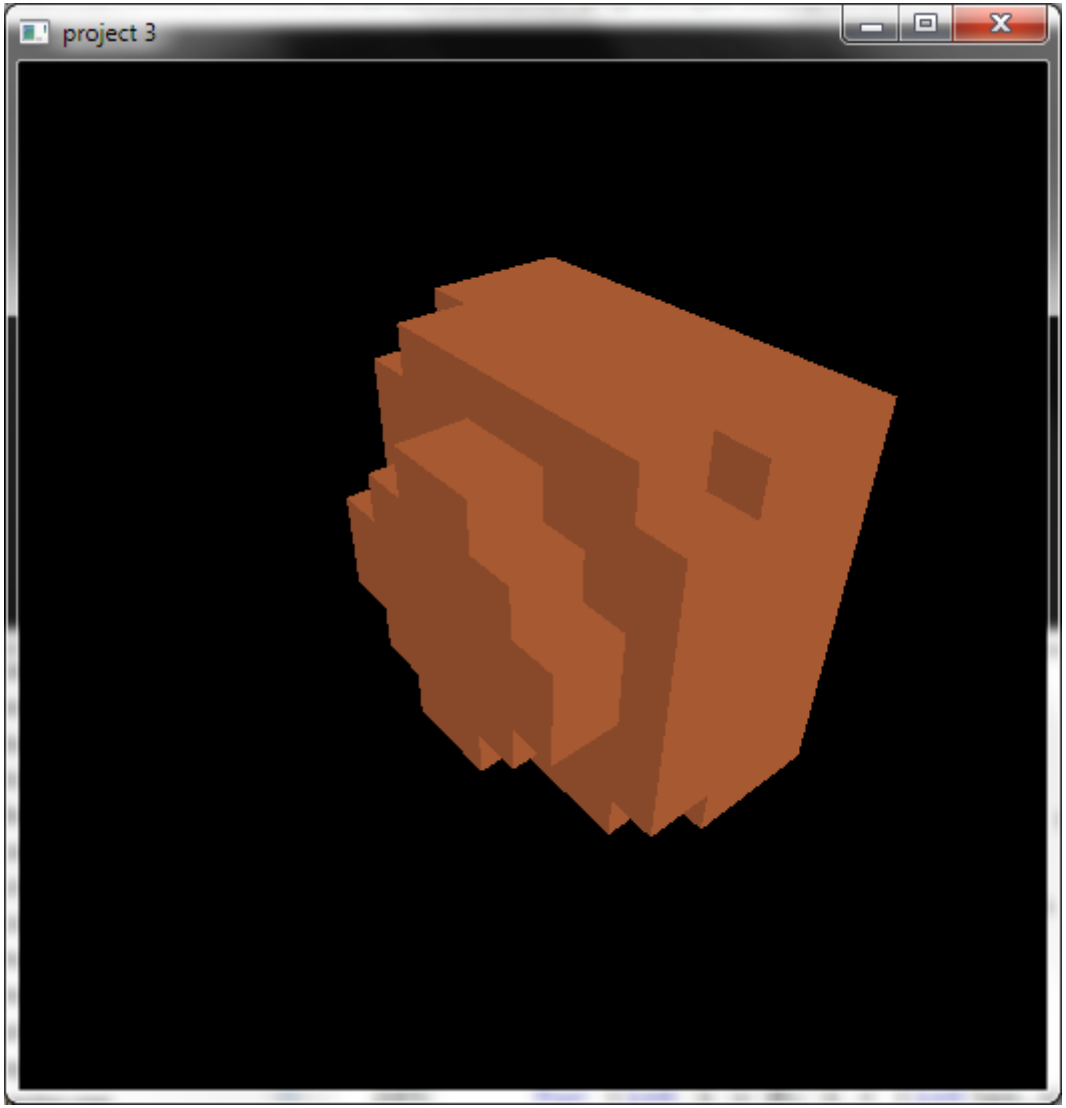
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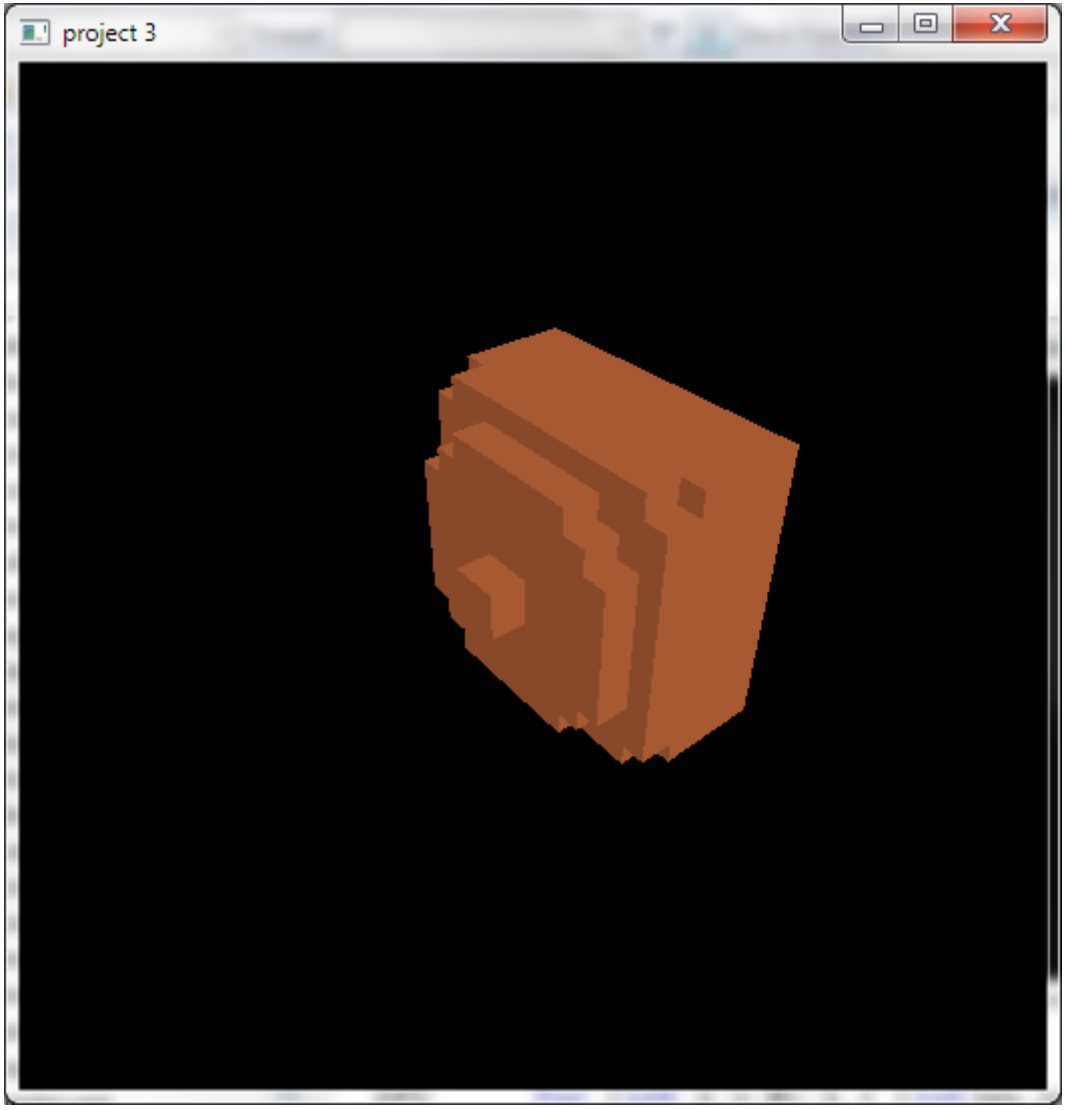
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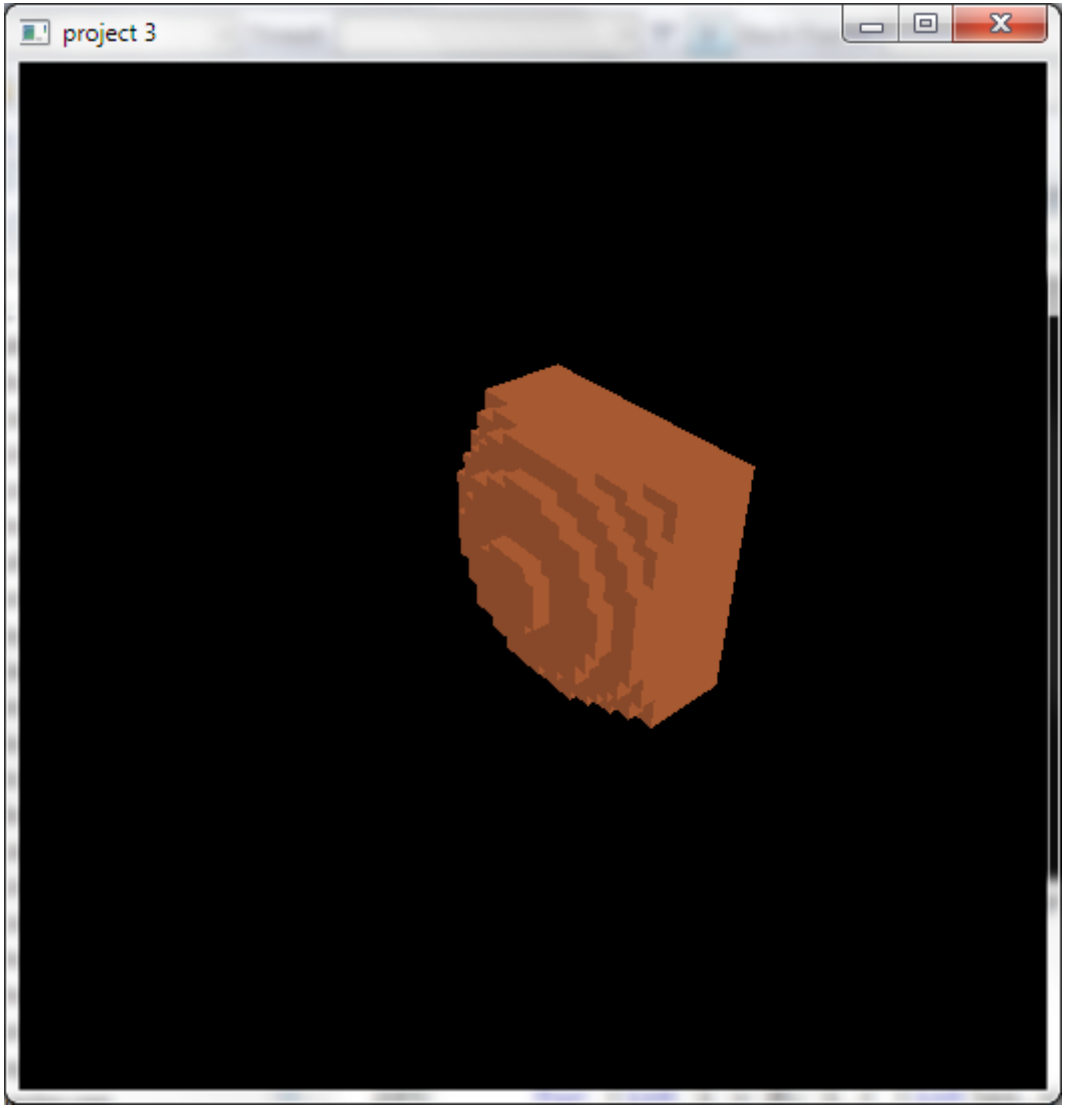
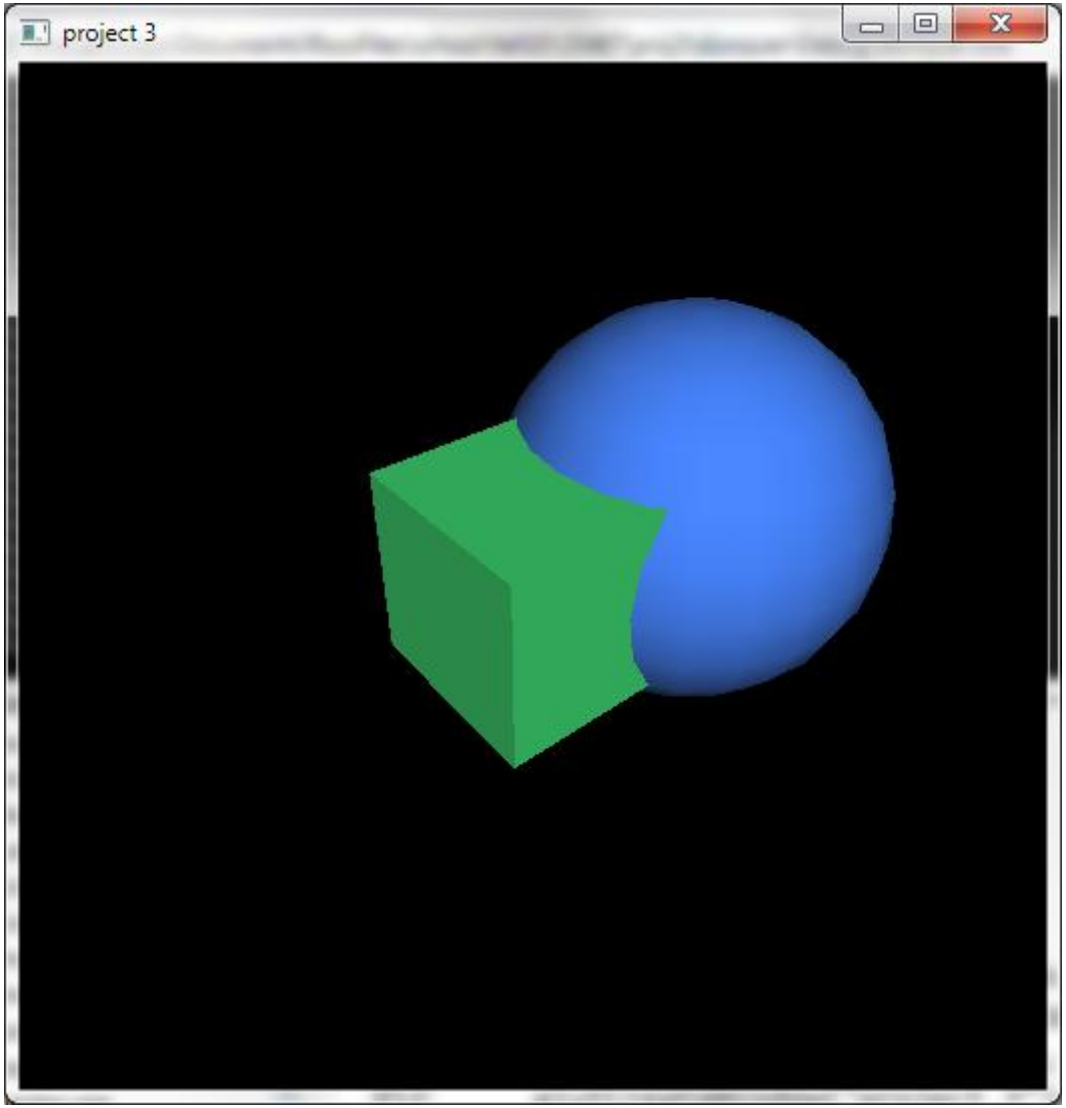

project 3

# Fast Version

1. Construct the smallest box possible that contains both bodies.
2. Calculate max(d1, d2) at the center of the box, where d1 and d2 are the SDFs of the bodies.
3. Is the value greater than the size of the box?
    a. Yes? There's no way the bodies are colliding in the box. Stop.
    b. No? Keep going.
4. Divide the box into eight smaller, equally sized ones.
5. Calculate max(d1, d2) at the center of each of these boxes.
6. Pick the one that has the smallest value.
7. Repeat (2) - (6) for this box.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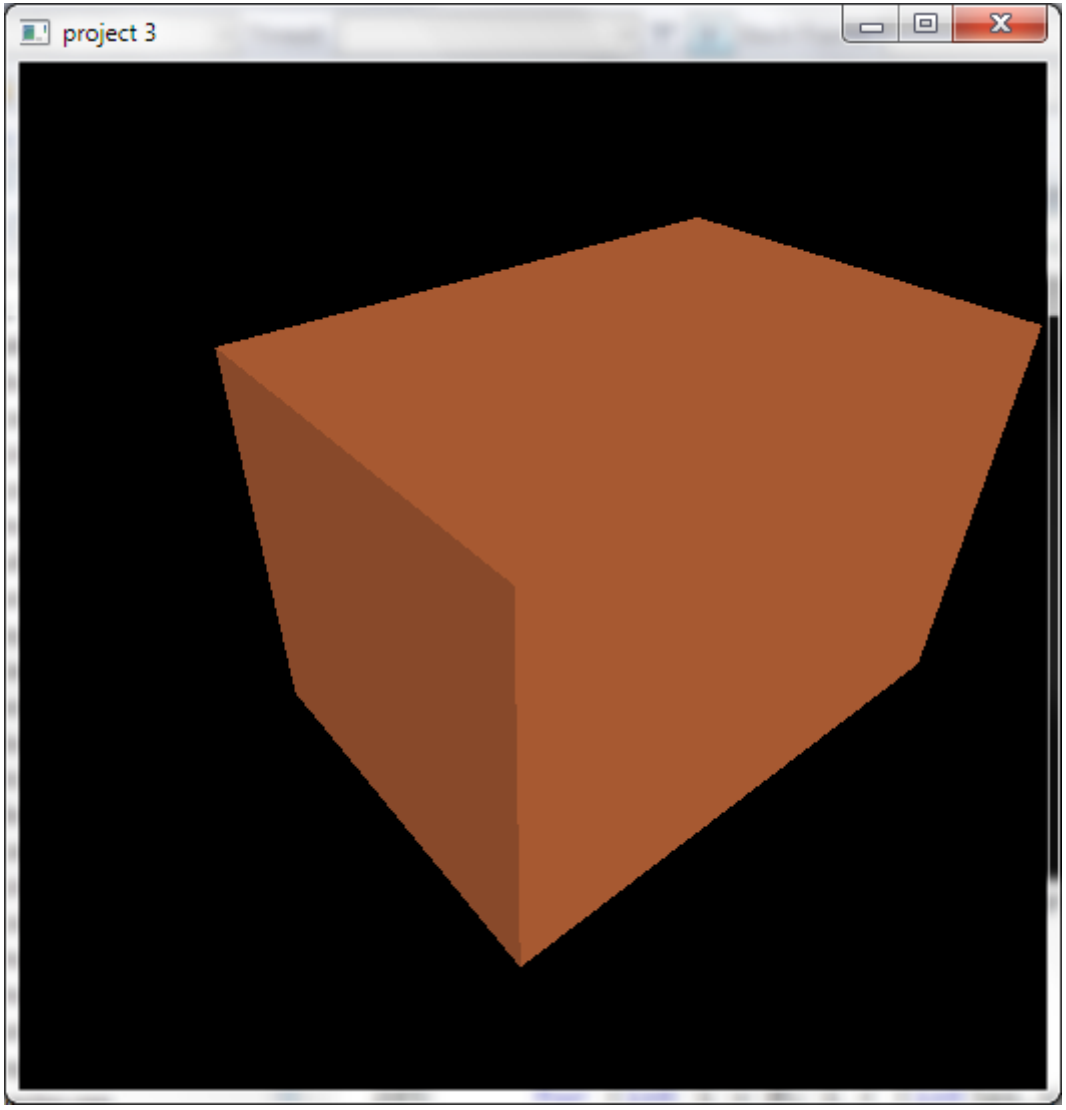
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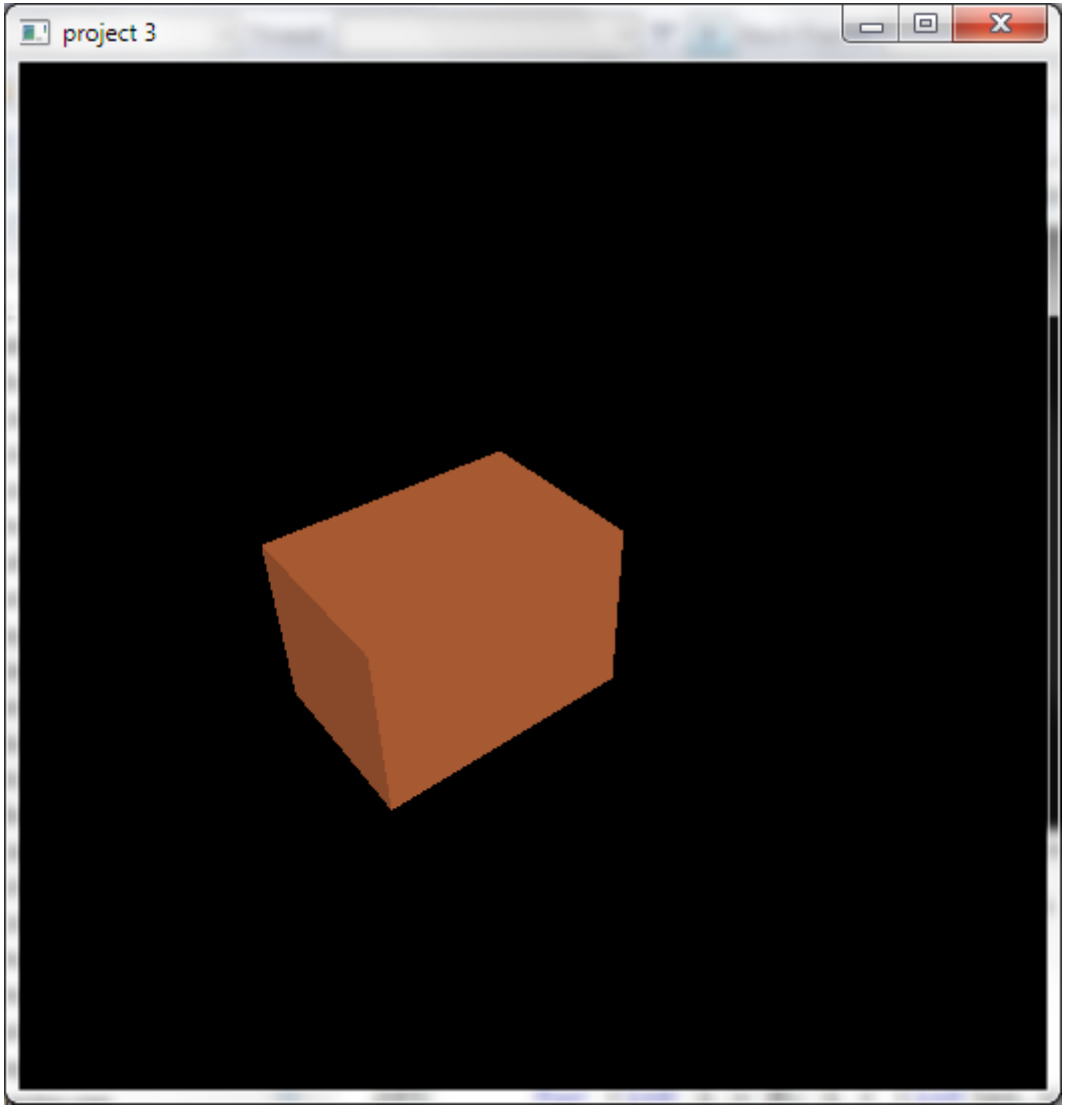
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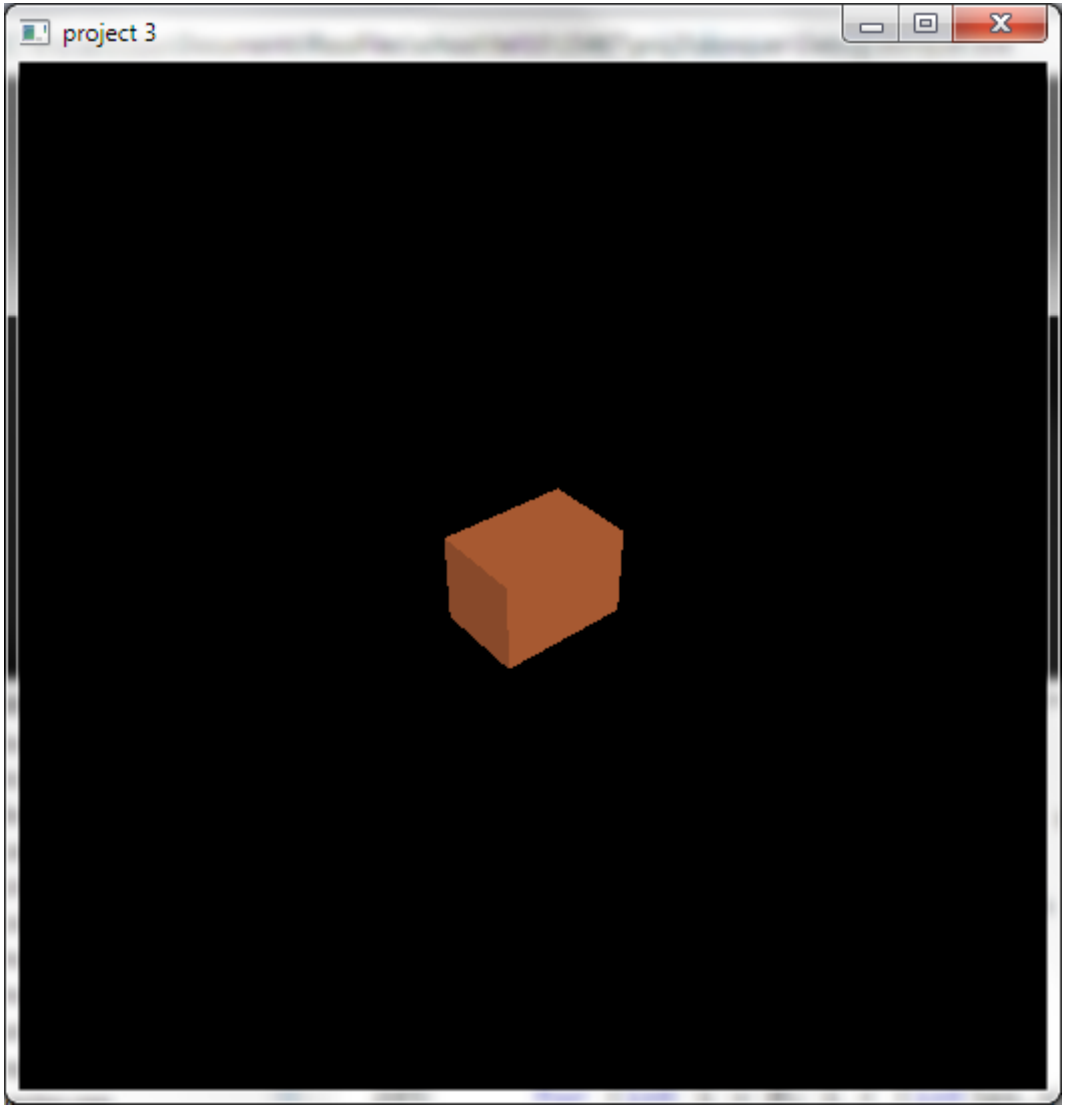
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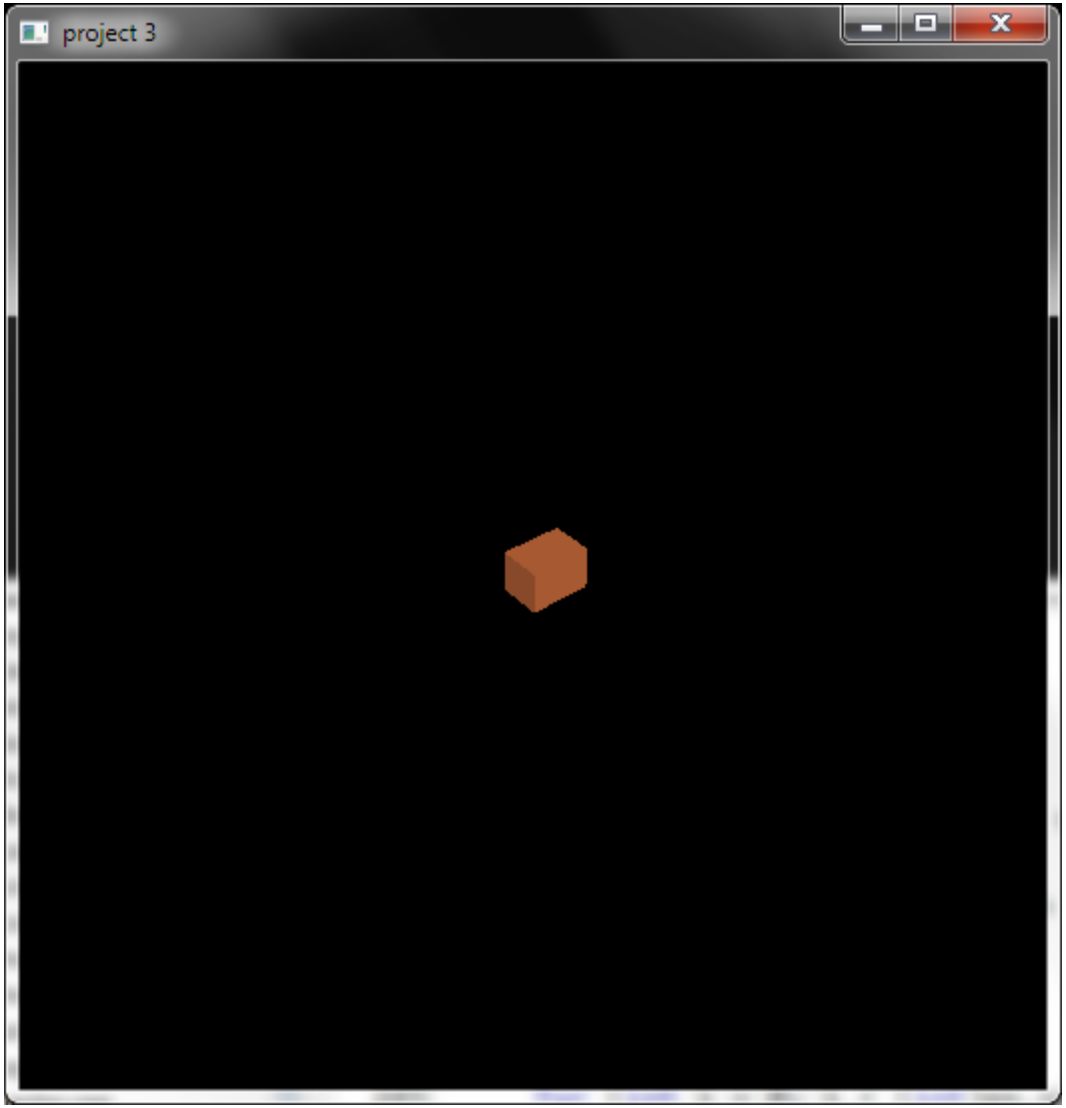
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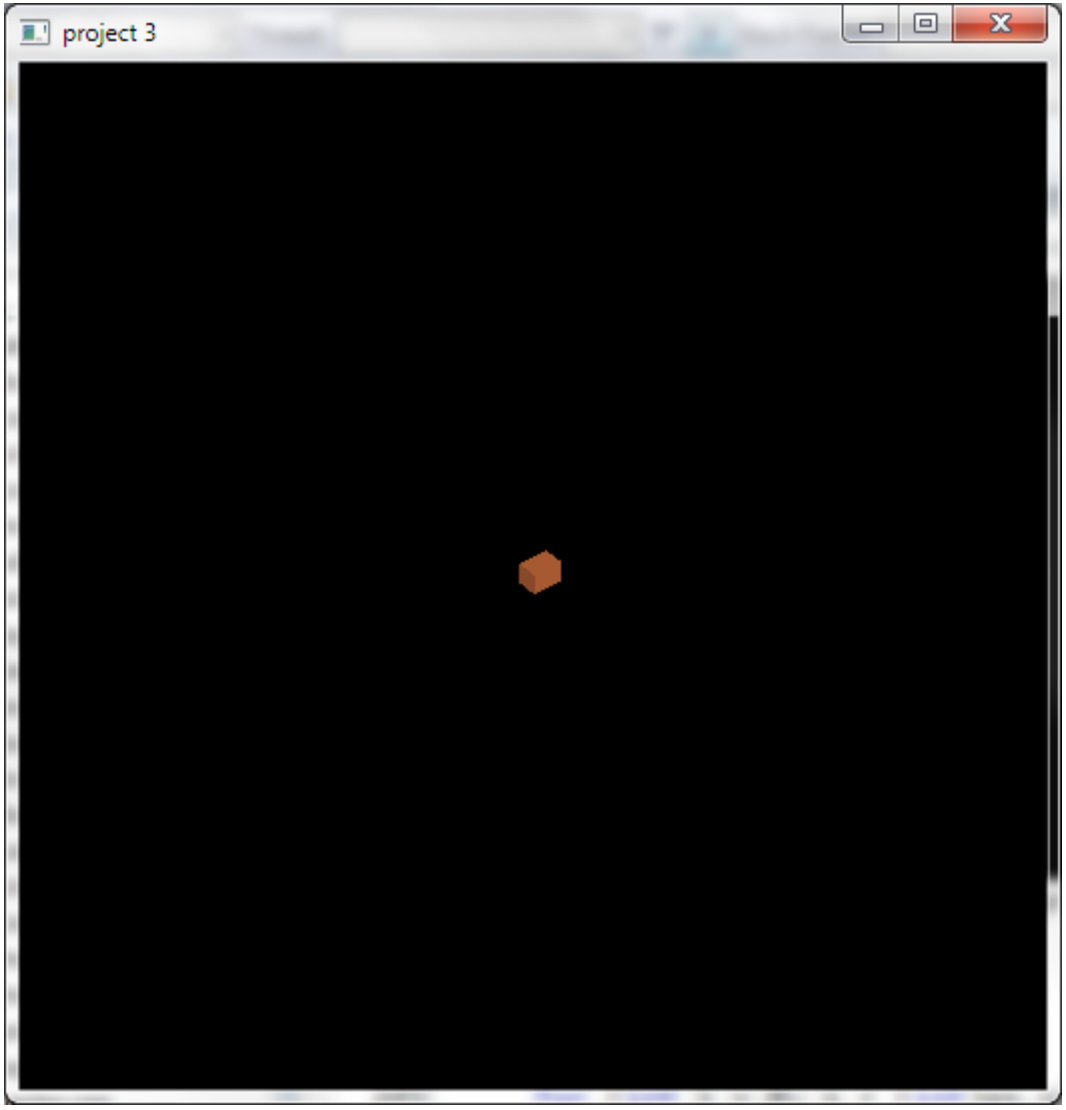
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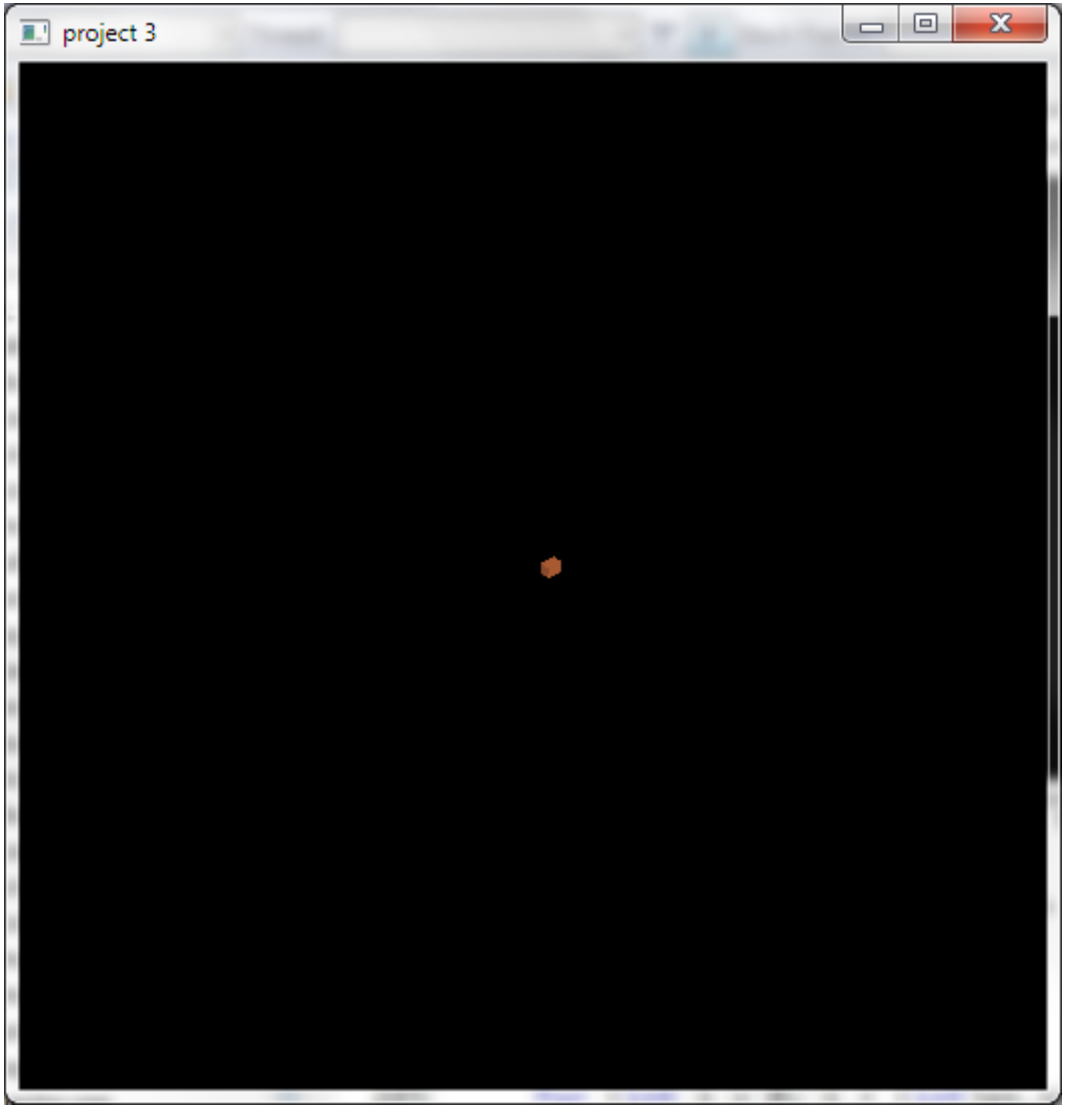
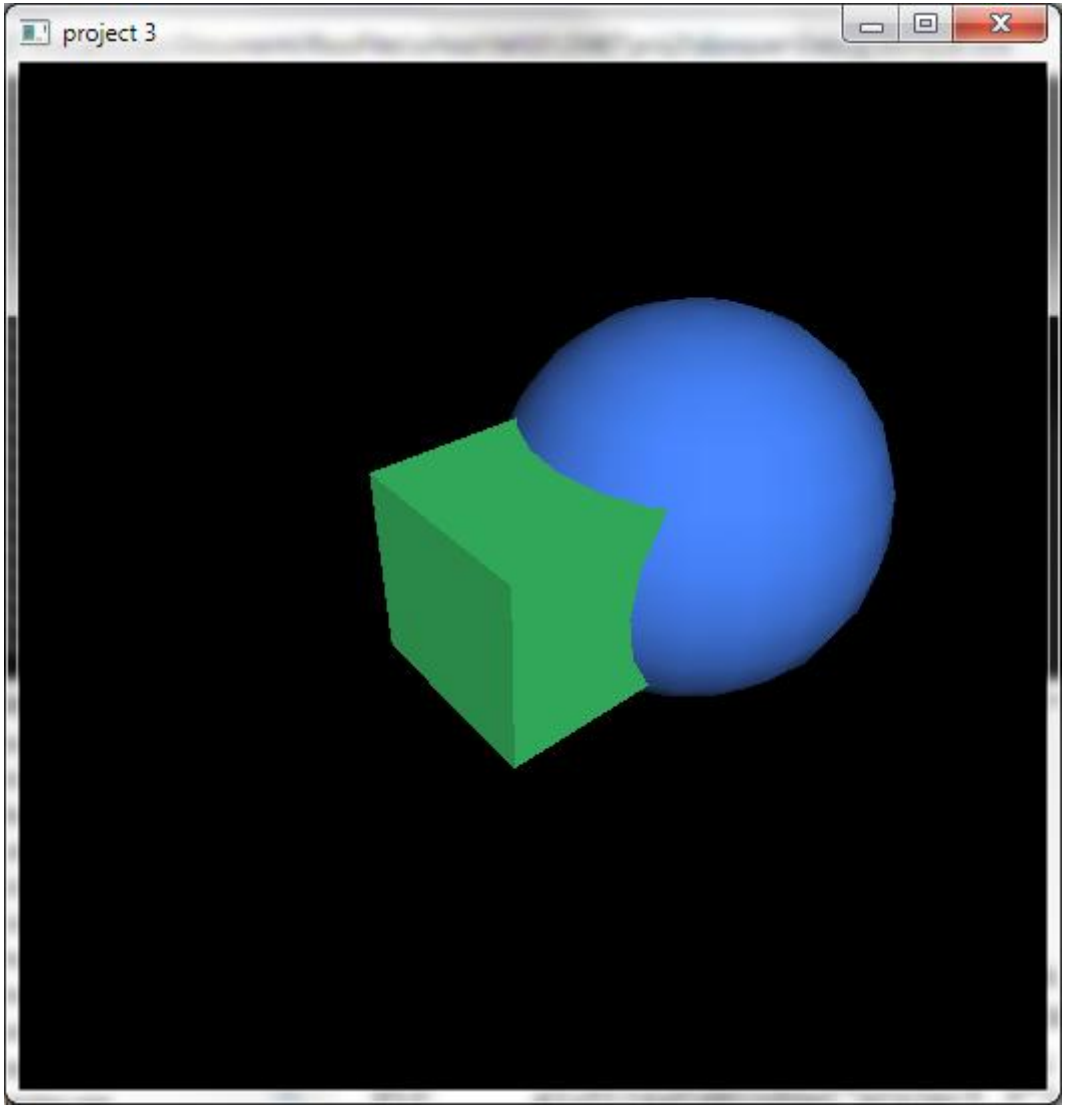

project 3

# Hybrid Version

1. Construct the smallest box possible that contains both bodies.
2. Calculate max(d1, d2) at the center of the box, where d1 and d2 are the SDFs of the bodies.
3. Is the value greater than the size of the box?
   a. Yes? There's no way the bodies are colliding in the box. Stop.
   b. No? Keep going.
4. Divide the box into eight smaller, equally sized ones.
5. Calculate max(d1, d2) at the center of each of these boxes.
6. Pick the one that has the smallest value.
7. Pick any other of the seven boxes that has a value of max(d1, d2) equal or close to that of the box chosen in (6).
8. Repeat (2) - (6) for this box.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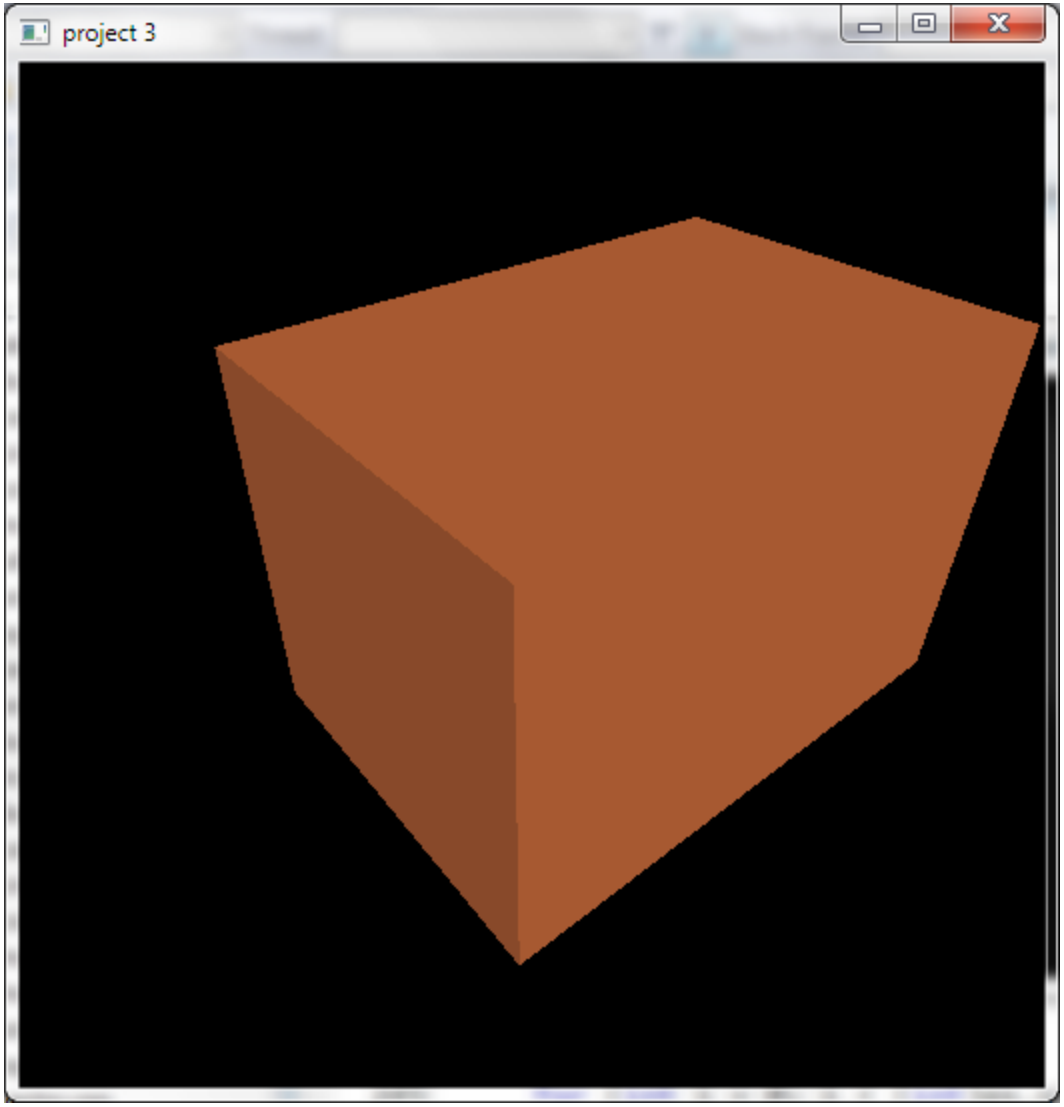
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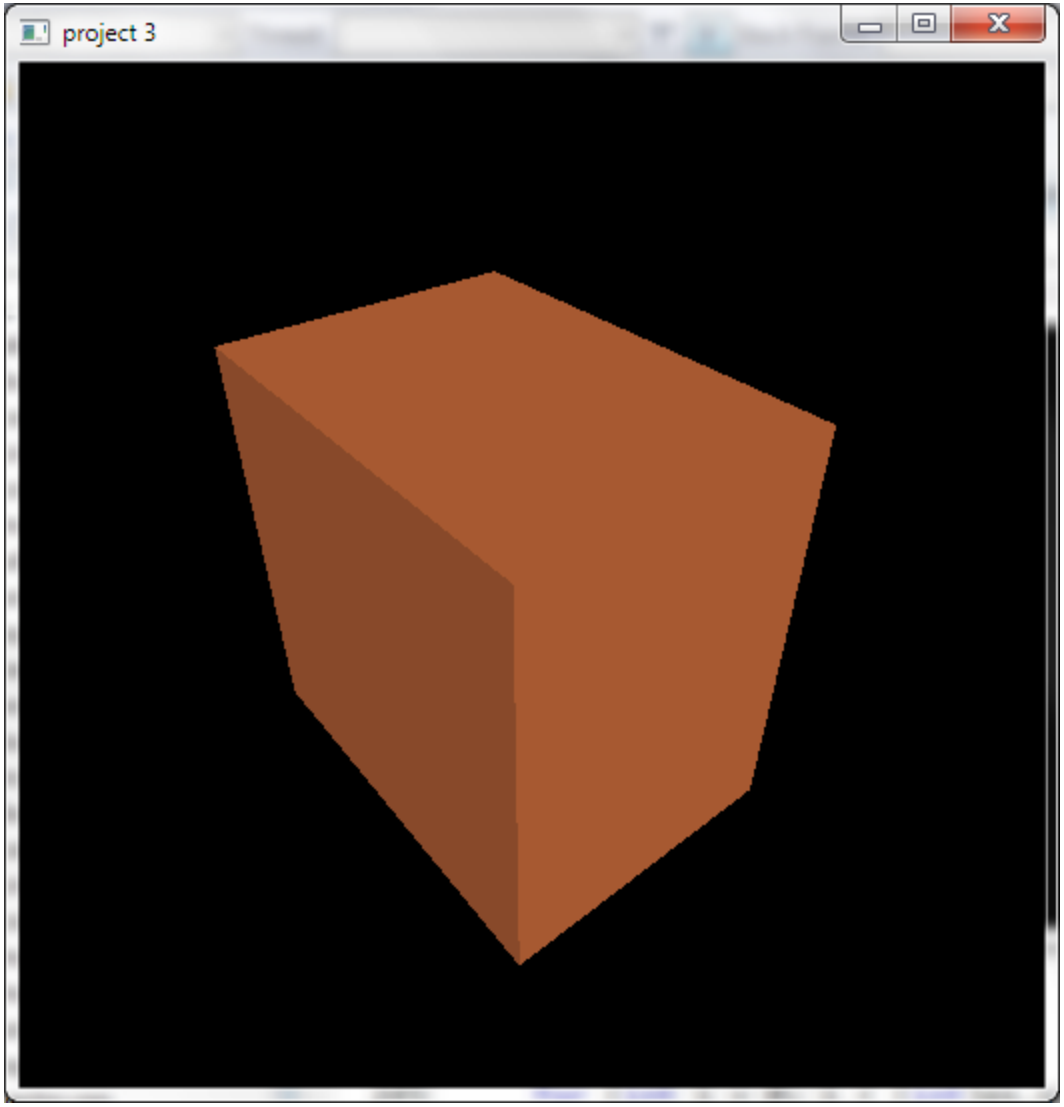
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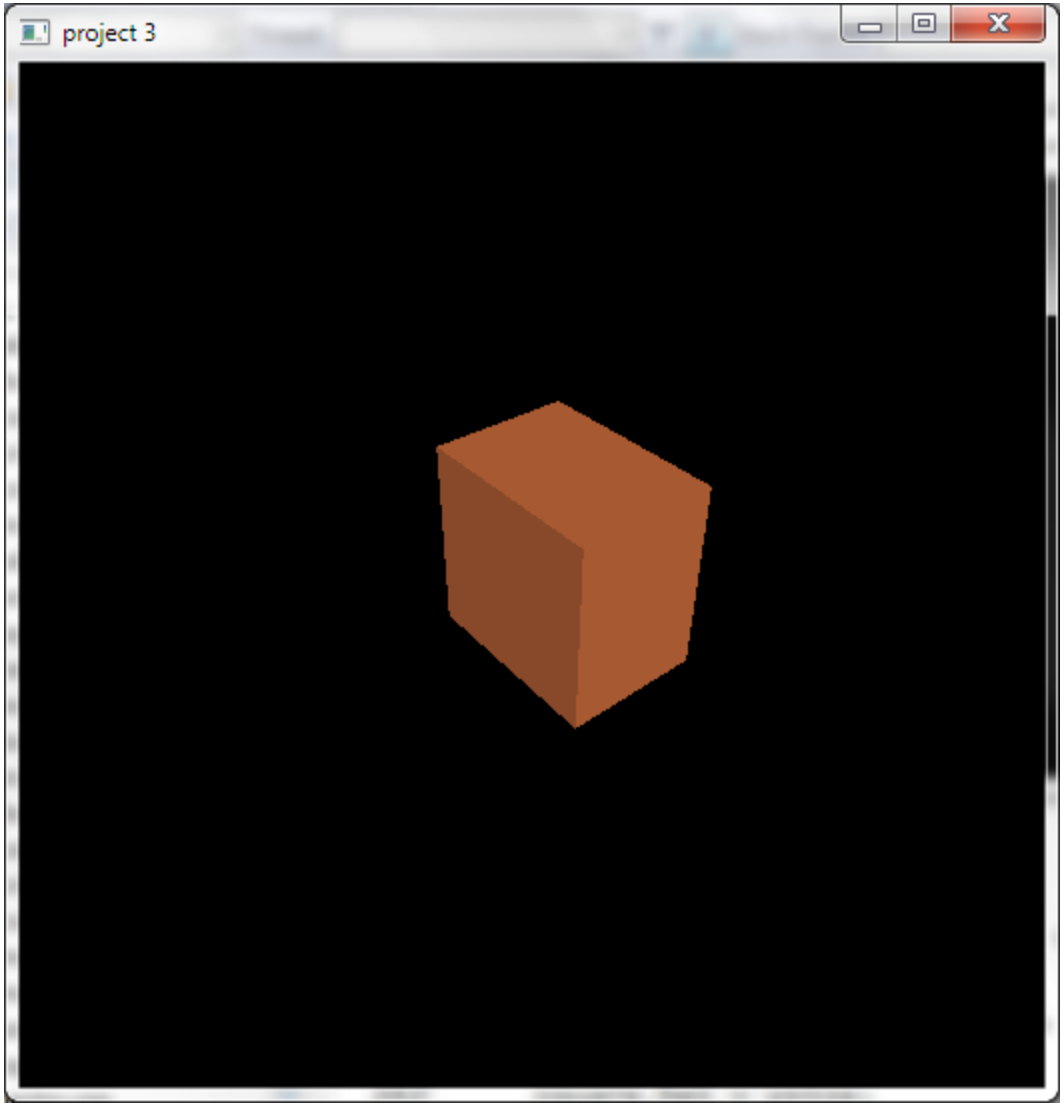
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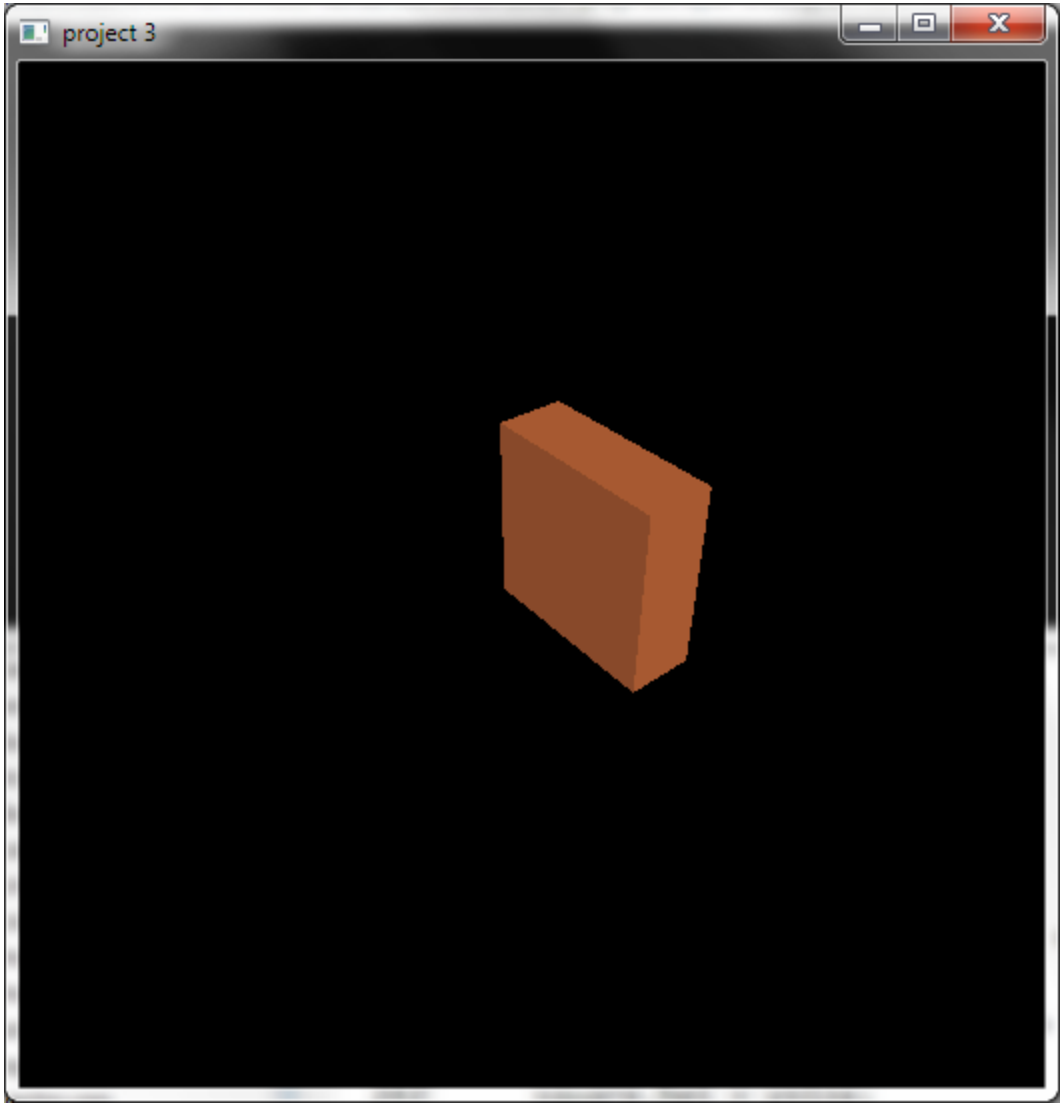
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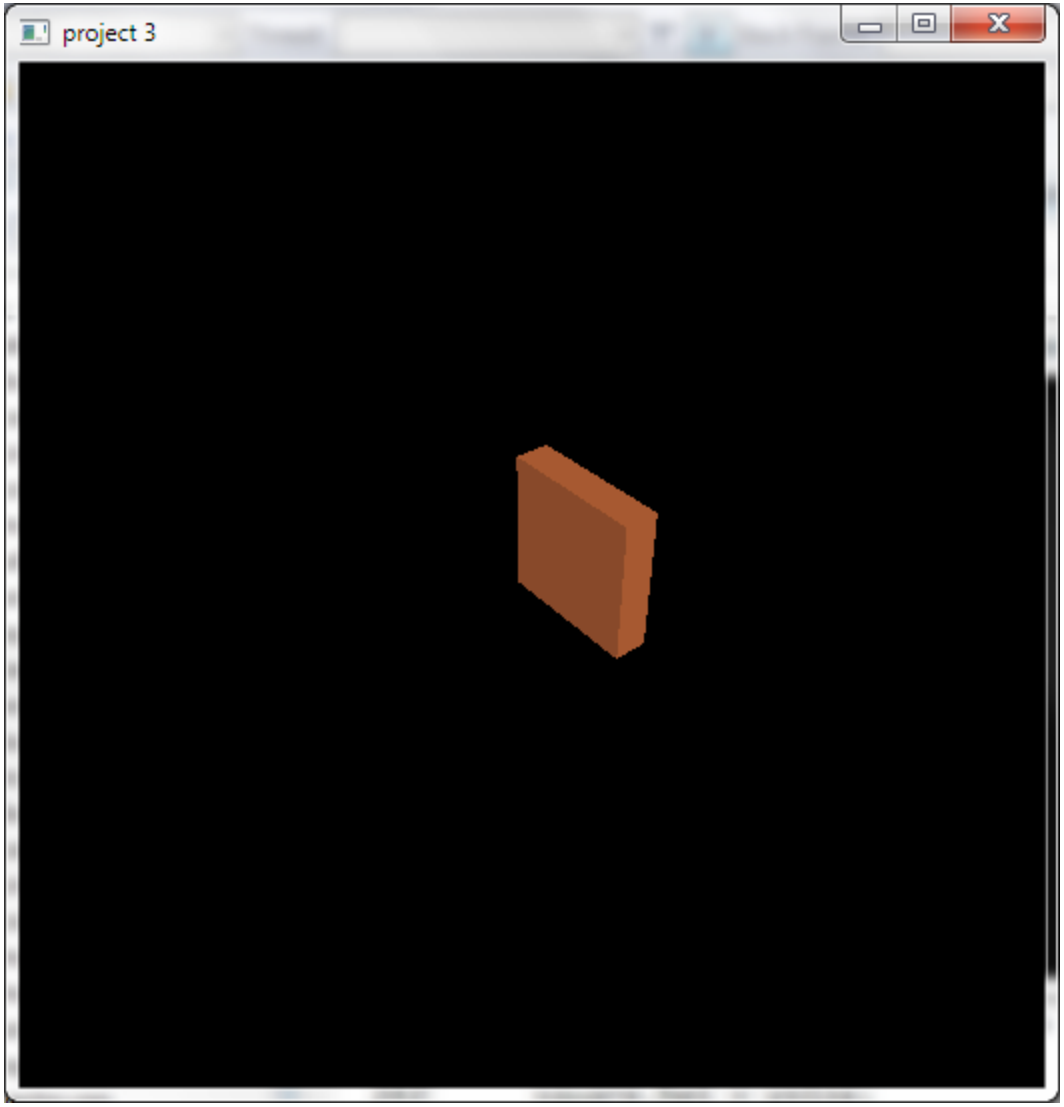
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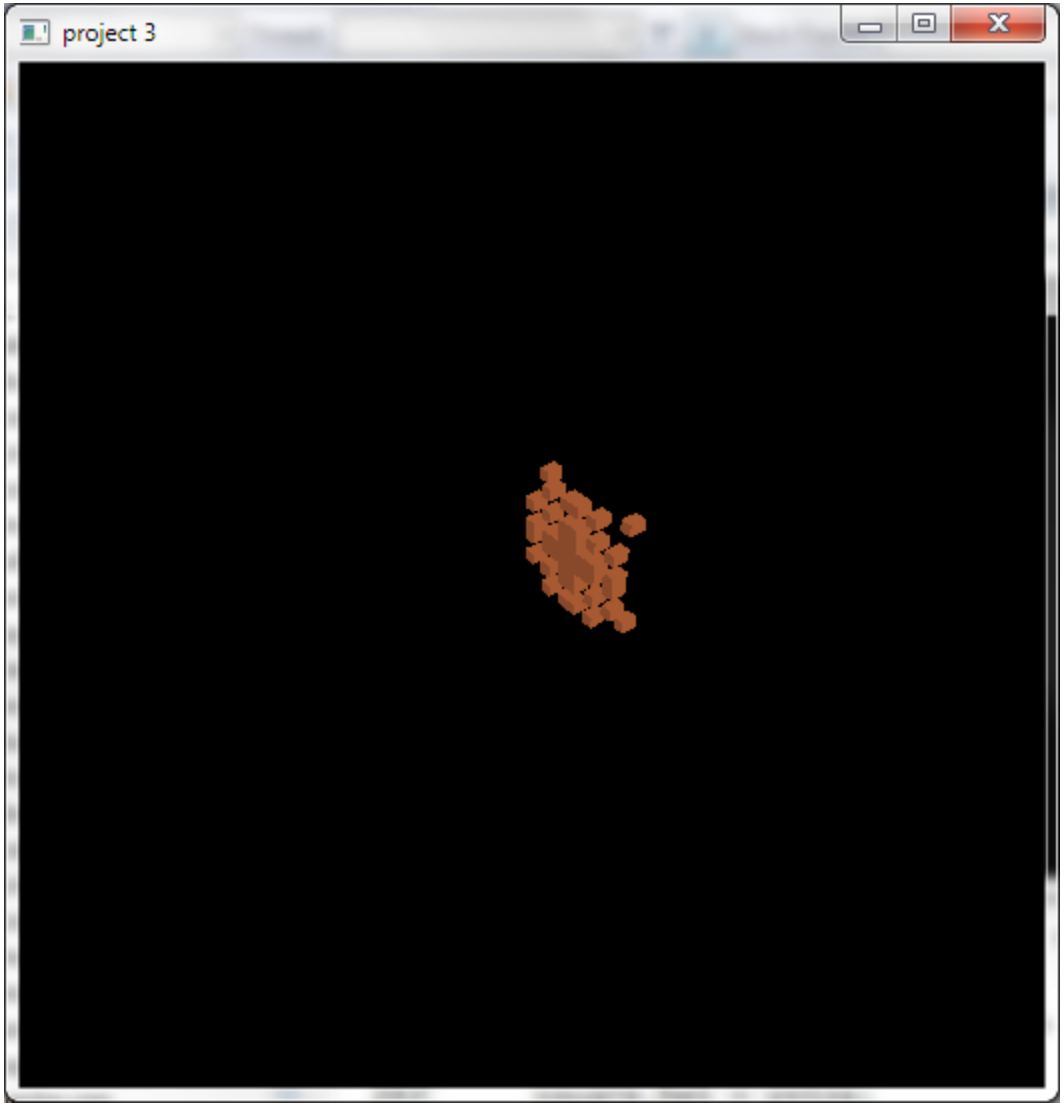
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# Demos

# Questions...?