PRINT your student ID: 10092007

PRINT AND SIGN your name: Johnson, Chell (last) (first) (signature)

PRINT your Unix account login: cs70-

PRINT your discussion section and GSI: Caroline

<table>
<thead>
<tr>
<th>Section</th>
<th>Time</th>
<th>Location</th>
<th>GSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>9-10am</td>
<td>6 Evans</td>
<td>ATLAS</td>
</tr>
<tr>
<td>2</td>
<td>10-11am</td>
<td>71 Evans</td>
<td>ATLAS</td>
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<tr>
<td>3</td>
<td>11-12pm</td>
<td>71 Evans</td>
<td>P-body</td>
</tr>
<tr>
<td>4</td>
<td>12-1pm</td>
<td>2 Evans</td>
<td>P-body</td>
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<tr>
<td>5</td>
<td>1-2pm</td>
<td>87 Evans</td>
<td>Rattman</td>
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<tr>
<td>6</td>
<td>2-3pm</td>
<td>2070 VLSB</td>
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<tr>
<td>7</td>
<td>3-4pm</td>
<td>85 Evans</td>
<td>Curiosity-core</td>
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<tr>
<td>8</td>
<td>4-5pm</td>
<td>9 Evans</td>
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<td>5-6pm</td>
<td>9 Evans</td>
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<td>3105 Etch.</td>
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<td>151 Barr.</td>
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<td>13</td>
<td>6-7pm</td>
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<td>14</td>
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<tr>
<td>15</td>
<td>4-5pm</td>
<td>156 Dwin.</td>
<td>Fact-core</td>
</tr>
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</table>

Names of the people sitting next to you: Wheatley, Weighted Companion Cube

You may consult your three handwritten note sheets. Phones, calculators, tablets, and computers are not permitted. No collaboration is allowed at all and you are not allowed to look at another’s work.

Please write your answers in the spaces provided in the test; in particular, we will not grade outside a problem’s designed space unless you specifically tell us where to find your extra work.

You have 180 minutes. There are 4 sections (one is an optional extra credit section), of varying numbers of points. The sections and the questions within are of varying difficulty, so avoid spending too long on any one question.

Do not turn this page until your instructor tells you to do so.
SOME APPROXIMATIONS AND OTHER USEFUL TRICKS THAT MAY OR MAY NOT COME IN HANDY:

\[ n! \approx \sqrt{2\pi n} \left(\frac{n}{e}\right)^n \]

\[ \binom{n}{k} \leq \left(\frac{ne}{k}\right)^k \]

\[ \lim_{n \to \infty} \left(1 + \frac{x}{n}\right)^n = e^x \]

When \( x \) is small, \( \ln(1 + x) \approx x \)

When \( x \) is small, \( (1 + x)^n \approx 1 + nx \)

The Golden Rule of 70 (and Engineering generally) applies: if you can’t solve the problem in front of you, state and solve a simpler one that captures at least some of its essence. You’ll get partial credit for doing so, and maybe you’ll find yourself on a path to the solution.

Source: http://www.math.unb.ca/~knight/utility/NormTble.htm
Section 1: Mandatory straightforward questions (50%)

You get one drop: do 9 out of the following 10 questions.

1. This was a triumph.

(Show your work)

2. I’m making a note here: HUGE SUCCESS.
3. It’s hard to overstate my satisfaction.

(Show your work)

4. Aperture Science

(Show at least some work)
5. We do what we must because we can.

1. 

2. 
6. For the good of all of us... Except the ones who are dead.
7. **But there’s no sense crying over every mistake.**

No explanations are required, just circle the correct choice. Incorrect answers will be penalized. *However, only 5 out of 7 correct answers are required for full credit.*

1. 

2. 

3. 

4. 

5. 

6. 

7. 

8. **You just keep on trying till you run out of cake.**

1. 

2. 

3. 

4. 

5. 
9. **And the Science gets done.**

(Show your work or give some explanation as to how you got to your answer and why you believe it to be correct.)
10. **And you make a neat gun.**
Section 2: True/false (15%)

For the questions in this section, determine whether the statement is true or false. If true, prove the statement is true. If false, provide a counterexample.

You get one drop: do 3 out of the following 4 questions.

11. For the people who are still alive.

Mark one: TRUE or FALSE.

12. I’m not even angry.

Mark one: TRUE or FALSE.
13. I’m being so sincere right now.

Mark one: TRUE or FALSE.

14. Even though you broke my heart and killed me.

Mark one: TRUE or FALSE.
Section 3: Harder Story Problems (35%)

15. And tore me to pieces.
16. And threw every piece into a fire.

a)
b)
17. As they burned it hurt because I was so happy for you!

(Hint: 

(Second hint: 

)}
Section 4: Optional extra credit question

We suggest doing this only if you have time: it won’t be worth that much.

18. Now these points of data make a beautiful line.
And we’re out of beta.
We’re releasing on time.
So I’m GLaD. I got burned.
Think of all the things we learned
for the people who are still alive.
Go ahead and leave me.
I think I prefer to stay inside.
Maybe you’ll find someone else to help you.
Maybe Black Mesa
THAT WAS A JOKE.
HAHA. FAT CHANCE.
Anyway, this cake is great.
It’s so delicious and moist.
Look at me still talking
when there’s Science to do.
When I look out there, it makes me GLaD I’m not you.
I’ve experiments to run.
There is research to be done.
On the people who are still alive.
And believe me I am still alive.
I’m doing Science and I’m still alive.
I feel FANTASTIC and I’m still alive.
While you’re dying I’ll be still alive.
And when you’re dead I will be still alive.