

# Final Exam

## CS2a/Aut04/ 30 points

This is a 3 hour open-book, open-notes exam. You may not however use a calculator, computer, or cell-phone during the exam.

### I. [2 pts] Binary, Decimal, and Hexadecimal


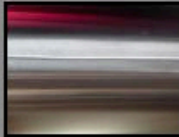
Google's IP address is 64.233.161.104.

- Convert Google's IP address to a 4 byte binary number by converting each decimal number to an 8 bit binary number.
- Convert Google's IP address to 8 hex characters.

### II. [10 pts] HTML and CSS

Write the HTML and CSS for the following page. All of the CSS should be in the head.

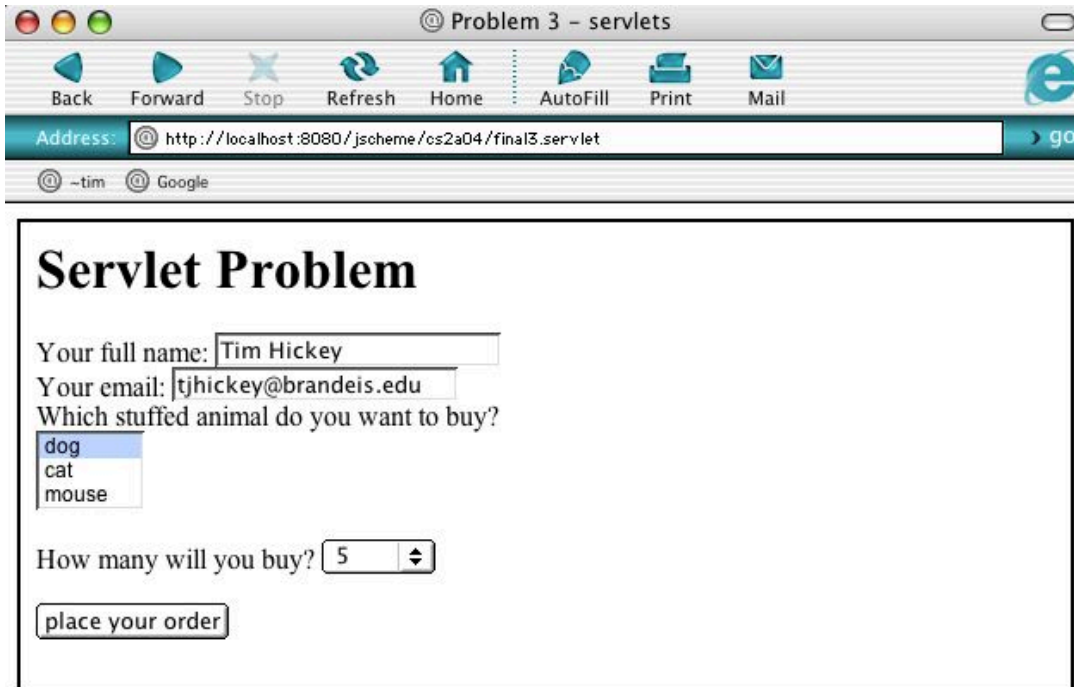
brandeis  
cs dept  
google

title	price	thumbnail
dew	\$9.95	
can	\$4.95	

*NOTES: (These don't have to be in your HTML) The background image for the page is in sincos3.jpg.  
The two images are in dew.jpg and can.jpg  
All colors are shades of gray, use rgb with same values for R,G,B  
The three links on the left (brandeis, cs dept, and google) become underlined when you hover over them.*

## [10 pts] Servlets

Write a servlet that displays the following page the first time it is visited:



The screenshot shows a web browser window titled "Problem 3 - servlets". The address bar contains "http://localhost:8080/jscheme/cs2a04/final3.servlet". The page content is as follows:

### Servlet Problem

Your full name:

Your email:

Which stuffed animal do you want to buy?

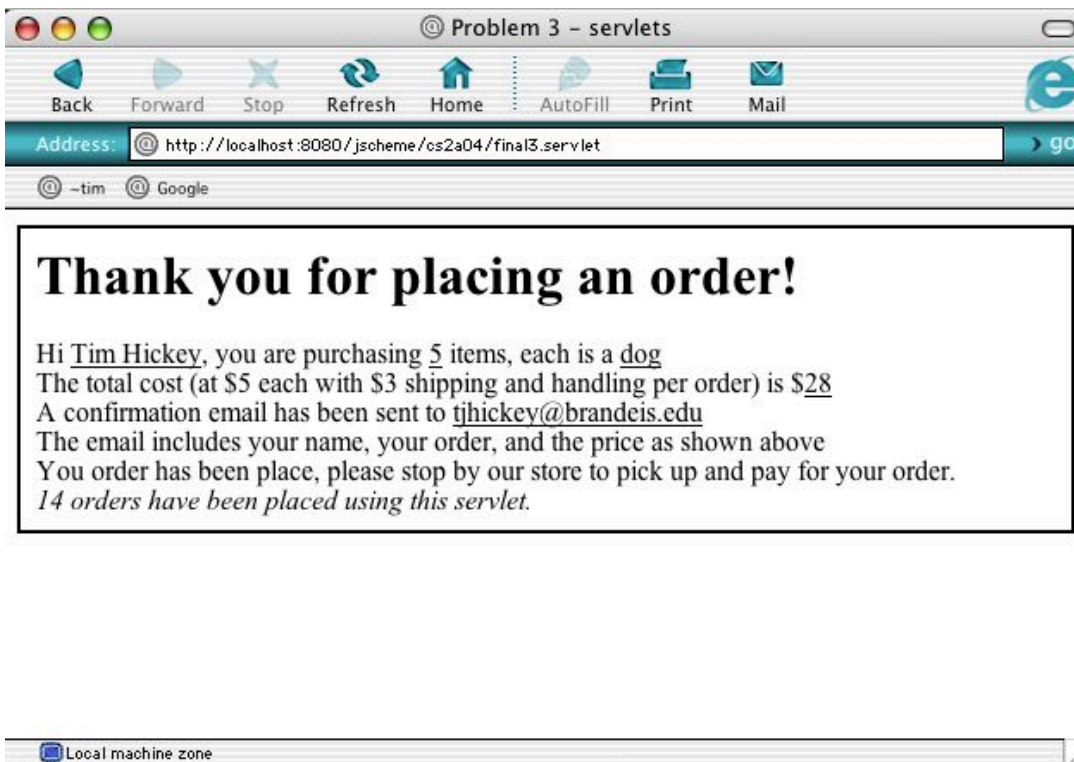
- dog
- cat
- mouse

How many will you buy?

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when the user fills out the form and clicks on the submit button, it

- calculates the total price for the order (including \$3 for shipping/handling),
- sends an email to the user,
- increments a counter to keep track of how many times the page was visited, and
- generates the following page



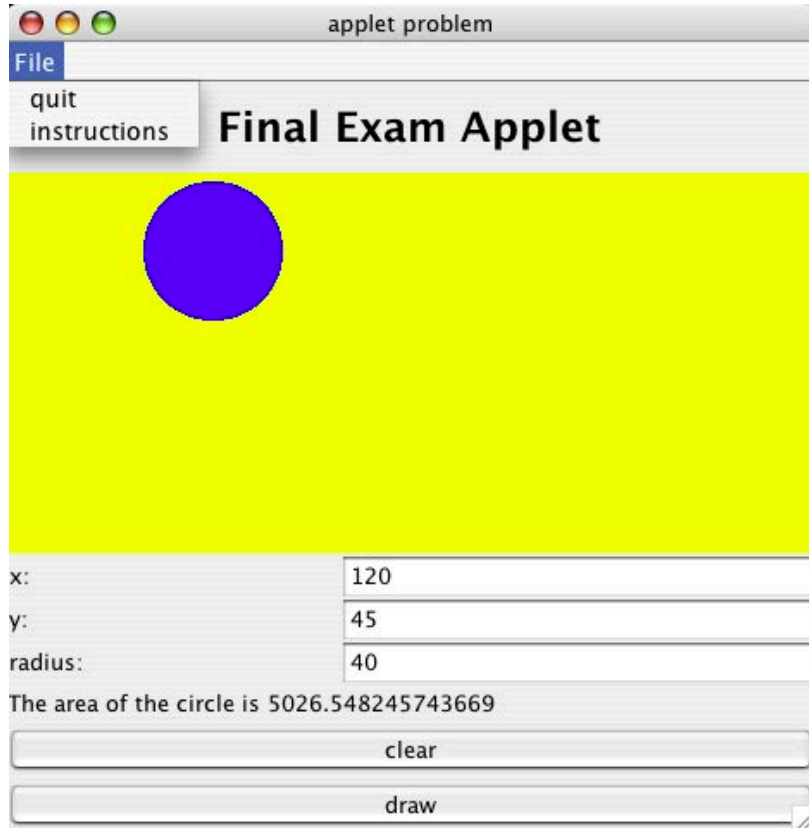
The screenshot shows the same web browser window after the form is submitted. The page content is as follows:

### Thank you for placing an order!

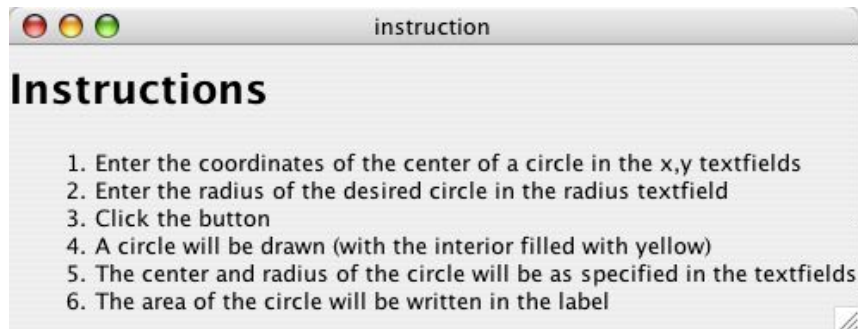
Hi Tim Hickey, you are purchasing 5 items, each is a dog  
The total cost (at \$5 each with \$3 shipping and handling per order) is \$28  
A confirmation email has been sent to [tjhickey@brandeis.edu](mailto:tjhickey@brandeis.edu)  
The email includes your name, your order, and the price as shown above  
Your order has been placed, please stop by our store to pick up and pay for your order.  
*14 orders have been placed using this servlet.*

### III. [5 pts] Applets

You are to write the following applet:



when the user presses the "instruction" menu item in the File menu, the following window is displayed:



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### IV. [3 pts] Scheme Tracing

Trace the following Scheme expressions:

- `(+ (- (* (/ 10 2) 3) 4) 5 (* 2 3 (- 4 3)))`
- `(define (f x y)  
 (if (< x 1) y (- (f (- x 1) (+ x y)) x)))  
(f 6 0)`