

Math 210
October 11, 2001

Exam 1

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12:00 — 1:20

DIRECTIONS: Part A (short answer) has 4 problems (5 points each) while Part B has 6 problems (10 points each). To receive full credit your solution must be clear and correct. No fuzzy reasoning. You have 1 hour 20 minutes. Closed book, no calculators, but you may use one 3 × 5 with notes on both sides. Please box your answers.

PART A: SHORT ANSWER, 20 POINTS (5 POINTS EACH)

A-1. A certain number written in base 2 is 10001. What is it in base 10?

A-2. To whom are you more closely related, your sister's son or your uncle (mother's brother)?

A-3. The next two players in a game win 50% and 30% of the time, respectively. What is the likelihood that *neither* of them will win this time?

A-4. What day of the week is January 7, 2004? [In case it helps, Dec. 31, 2000 was a Sunday.]

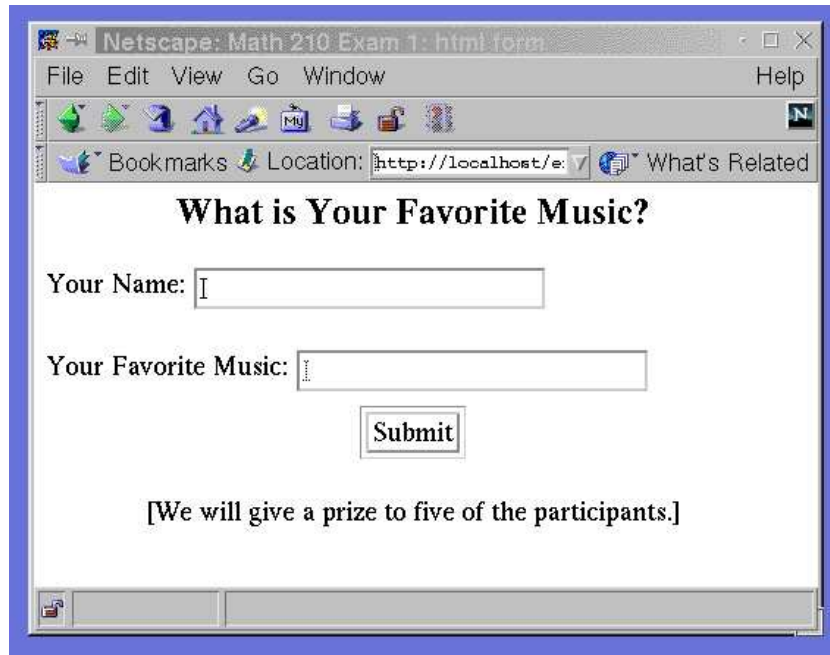
<i>Score</i>	
A	
B-1	
B-2	
B-3	
B-4	
B-5	
B-6	
<i>Total</i>	

PART B: 60 POINTS (10 POINTS EACH)

B-1. In the television actor's family, 10% of the females and 8% of the males drink tea. Moreover, two-thirds of the family are male. What percentage of this family drink tea?

B-2. A bowl contains 8 red balls and 5 green balls. You are blindfolded and simultaneously remove two balls from the bowl, one in each hand. What is the probability that you got one red ball and one green ball?

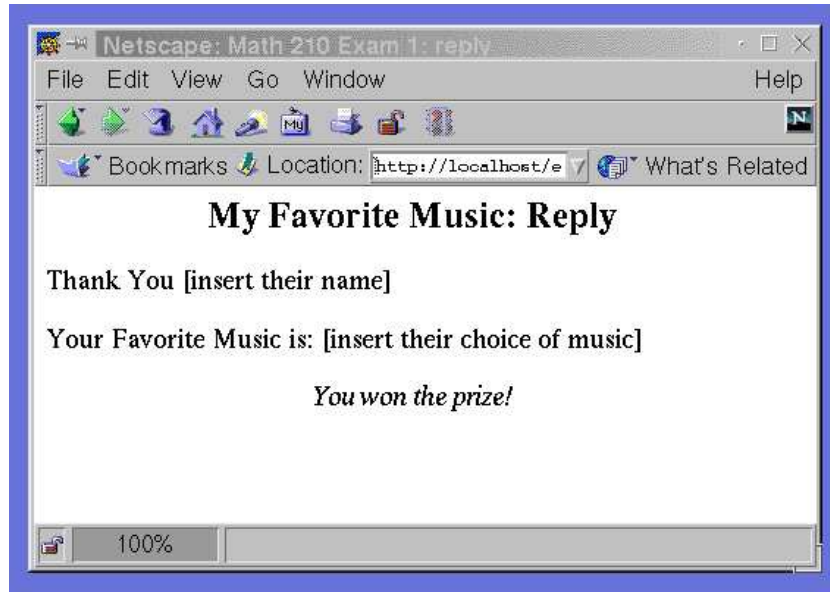
B-3. This problem and the next one should be read together. In this problem please write an html page that produces the Web Form just below. [For reference, on the last page of this exam there is a form you did earlier this semester.]



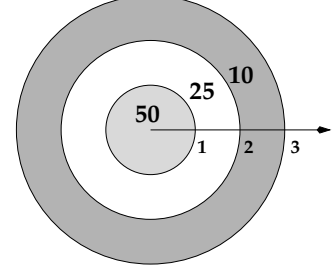
The image shows a Netscape browser window with the title "Netscape: Math 210 Exam 1: html form". The address bar shows "http://localhost/e:". The main content area contains the following HTML form:

```
<h2>What is Your Favorite Music?</h2>
<p>Your Name: <input type="text"/></p>
<p>Your Favorite Music: <input type="text"/></p>
<p><input type="submit" value="Submit"/></p>
<p>[We will give a prize to five of the participants.]</p>
```

B-4. This is a continuation of the previous problem. Write a perl script that uses the above data and responds with the following web form (assume that this person “won”). [For reference, on the last page of this exam there is a perl script you did earlier this semester.]



B-5. A big dart board consists of three concentric disks of radius 1, 2, and 3 feet. If a dart lands in the center disk you get 50 points. If it lands in the middle ring you get 25 points, while if it lands in the outer ring you get 10 points.



a). What is the probability that a randomly thrown dart will land in the outer ring?

b). What is the expected number of points you will get for a randomly thrown dart?

B-6. You are about to take a test for a relatively rare cancer that has an incidence of 0.1% among the general population. Thus, before taking the test, and in the absence of any other evidence, your best estimate of the likelihood of having the cancer is 1 in 1000.

Extensive trials have shown that the reliability of the test is 90%. More precisely, it gives a positive result in 10% of the cases where no cancer is present (*false positive*). Moreover, about 5% of the time the test fails to detect the cancer even though it is present (*false negative*).

QUESTION: If you test negative, what is the probability that you have this cancer?

Reference: An Old html and perl example

This is an html page that requests data for a fill-in form.

```
<html><head><title>Perl Example 1</title></head>
<body bgcolor=white>

<center><h2>Math 210 A simple script using Perl</h2></center>

<form action="/cgi-bin/210/perl_example1.pl">
You specify:
<p>
<center><b>x = </b><input type=text name="x" size=15>
<br><b>y = </b><input type=text name="y" size=15</center>
<p>
This computes <b>x + y</b>:
<p>
<center><input type=submit value="Submit"></center>
</form>
</body></html>
```

This is the perl script that processes the above.

```
#!/usr/bin/perl
push(@INC, "/home/httpd/cgi-bin");
require 5.003;
require "cgi-lib.pl";
#----- What This Does -----
# Input data:  x,  y.   Output: x + y
#----- Main Program -----
&ReadParse;
print &PrintHeader;
$z = $in{x} + $in{y};

print <<"end";
<html><head><title>Math 210, Perl Example 1 1</title></head>
<body bgcolor=white>
<center><h2> Output for Example 1</h2>

<i>Your input</i>:  <b> x = $in{x}, y = $in{y}</b>
<p>
<i>Answer</i>:  <b>x + y = $z</b>
</center></body></html>
end
```