Math 150  NEATLY PRINT YOUR LEGAL NAME: ________________________________

Exam 3  STUDENT ID: __________________

Fall 2011  DATE: ________________________________

SECTION: Circle your correct section number.

Tuesday recitations:  501  503  505  507  509  511
Thursday recitations:  502  504  506  508  510  512

TEST NO.: ASPEN

"On my honor, as an Aggie, I have neither given nor received unauthorized aid on this academic work."

________________________________
Signature of student

Academic Integrity Task Force, 2004

My signature in this blank allows my instructor to pass back my graded exam in class or allows me to pick up my graded exam in class on the day the exams are returned. If I do not sign the blank or if I am absent from class on the day the exams are returned, I know I must show my Texas A&M student ID during my instructor’s office hours to pick up my exam.

Signature of student ____________________________________________

NO CALCULATORS ALLOWED!

This is a 10-question multiple-choice exam; there is no partial credit. Each problem is worth 5 points for a total of 50 points. There will be a 5-point bonus if you have no transgressions. Transgressions include not having the correct Scantron form 882E, not filling out your Scantron form correctly, having a folded or mutilated Scantron, having your cell phone ring or vibrate, not having your TAMU student ID, not following directions, not turning in your exam and Scantron on time (you must be finished filling in your Scantron and exam cover before time is called). The Scantron will not be returned so also mark all your answers on this test paper.

ALL CELL PHONES MUST BE TURNED OFF AND PLACED IN YOUR BACKPACK!

SCANTRON: Please double check to make sure you have completed your Scantron correctly, as shown below.

Name: print your legal name neatly (NO NICKNAMES)
Subject: Math 150  Test No.: ASPEN
Date: November 2011  Period: your section number
1. Exactly solve the system of equations for all points with real number coordinates. Then find the sum of all the y-values of these points.

\[(x-2)^2 + (y+9)^2 = 36\]
\[8x + (y+9)^2 = 32\]

a. 12  
b. −18  
c. 0  
d. −36  
e. −9

2. Which one has the correct characteristics of the function \(f(x) = 2^{x+d} + 3\)?

<table>
<thead>
<tr>
<th></th>
<th>Domain</th>
<th>Range</th>
<th>x-intercept</th>
<th>y-intercept</th>
<th>Asymptote</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>((-\infty, \infty))</td>
<td>((-\infty, \infty))</td>
<td>(0, 5)</td>
<td>(0, 19)</td>
<td>none</td>
</tr>
<tr>
<td>b.</td>
<td>((-\infty, \infty))</td>
<td>(3, \infty)</td>
<td>none</td>
<td>(0, 19)</td>
<td>(y = 3)</td>
</tr>
<tr>
<td>c.</td>
<td>(3, \infty)</td>
<td>((-\infty, \infty))</td>
<td>(0, 19)</td>
<td>none</td>
<td>(y = 4)</td>
</tr>
<tr>
<td>d.</td>
<td>((-\infty, \infty))</td>
<td>(3, \infty)</td>
<td>none</td>
<td>(0, 19)</td>
<td>none</td>
</tr>
<tr>
<td>e.</td>
<td>((-\infty, \infty))</td>
<td>(4, \infty)</td>
<td>none</td>
<td>(0, 5)</td>
<td>(y = 3)</td>
</tr>
</tbody>
</table>

3. The output of a particular nuclear source is \(P(t) = P(0)e^{\frac{-2t}{19}}\), where \(t\) is time in years. What is the exact half-life of this nuclear source?

a. \(\frac{19\ln 2}{2}\) years  
b. \(\ln 19\) years  
c. \(\frac{-19\ln 2}{2}\) years  
d. None of these  
e. \(\ln 2 - \frac{2}{19}\) years

4. How many radians and revolutions, respectively, does 570 degrees equal?

a. None of these  
b. \(\frac{19\pi}{12}, \frac{19}{12}\) rev  
c. \(\frac{19\pi}{6}, \frac{19}{12}\) rev  
d. \(\frac{19\pi}{12}, \frac{19}{6}\) rev  
e. \(\frac{19\pi}{6}, \frac{19\pi}{6}\) rev
5. Exactly solve $3e^{-2x+4} - 7 = 20$ for $x$.

a. $2 - \frac{1}{2} \ln \frac{13}{3}$

b. $-\ln 3$

c. None of these

d. $\ln 3$

e. $2 - \ln 3$

6. Given the function $f(x) = \frac{5x^2 - 30x + 45}{x^2 - 2x - 8}$, what are the vertical and horizontal asymptotes and the \textbf{SUM} of its zeros (if there is only one zero, just give it), respectively.

a. $x = 5, y = -2, y = 4; \frac{-45}{8}$

b. $x = -2, x = 4, y = 5; 3$

c. $x = -2, x = 4, y = 5; \frac{-45}{8}$

d. $x = 2, x = -4, y = 5; 3$

e. None of these

7. If $f(x) = \frac{-1}{2} \ln (4x - 8)$, find its inverse function. You do NOT have to find its domain and range.

a. $f^{-1}(x) = \frac{1}{4} e^{-2x} - 2$

b. $f^{-1}(x) = \frac{1}{4} e^{-2x} + 8$

c. $f^{-1}(x) = \frac{1}{4} e^{-2x} - 8$

d. None of these

e. $f^{-1}(x) = \frac{1}{4} e^{-2x} + 2$
8. If \( f(x) = -6\cos(2x - 7) - 8 \) what are the amplitude and phase shift?
   a. 6, right \( \frac{7}{2} \)
   b. –6, down 8
   c. 6, right \( \frac{7\pi}{2} \)
   d. 6, left \( \frac{7}{2} \)
   e. –6, right \( \frac{7\pi}{2} \)

9. Exactly evaluate \( \cos \frac{23\pi}{12} \).
   a. \( \frac{\sqrt{3} + 1}{2} \)
   b. \( \frac{\sqrt{6} + \sqrt{2}}{4} \)
   c. \( \frac{-\sqrt{6} + \sqrt{2}}{4} \)
   d. \( \frac{\sqrt{6} - \sqrt{2}}{4} \)
   e. \( \frac{-\sqrt{6} - \sqrt{2}}{4} \)

10. Which function is represented by the graph?

   a. \( f(x) = \frac{4(x-1)^2}{(x+6)(x-3)} \)
   b. \( f(x) = \frac{4(x+1)}{(x-6)(x+3)} \)
   c. \( f(x) = \frac{4(x+1)^2}{(x+1)(x-6)(x+3)} \)
   d. \( f(x) = \frac{4(x-1)^3}{(x+6)(x-3)} \)
   e. \( f(x) = \frac{4(x+1)^2}{(x-6)(x+3)} \)
Math 150

NEATLY PRINT NAME: ______________________________

Exam 3

STUDENT ID: __________________________

Fall 2011

DATE: ________________________________

SECTION: Circle your correct section number.
Tuesday recitations: 501 503 505 507 509 511
Thursday recitations: 502 504 506 508 510 512

TEST NO.: SPRUCE

"On my honor, as an Aggie, I have neither given nor received unauthorized aid on this academic work."

________________________________
Signature of student

Academic Integrity Task Force, 2004

My signature in this blank allows my instructor to pass back my graded exam in class or allows me to pick up my graded exam in class on the day the exams are returned. If I do not sign the blank or if I am absent from class on the day the exams are returned, I know I must show my Texas A&M student ID during my instructor’s office hours to pick up my exam.

Signature of student ________________________________

NO CALCULATORS ALLOWED!

This is a 10-question work-out exam. Each problem is worth 5 points for a total of 50 points. Write all solutions in the space provided as full credit will not be given without complete, correct accompanying work, even if the final answer is correct. Fully simplify all your answers, and give exact answers unless otherwise stated. Justify your answers algebraically whenever possible. Circle your final answer. Remember your units!

ALL CELL PHONES MUST BE TURNED OFF AND PLACED IN YOUR BACKPACK!

The problems for the exam will be similar to those discussed in class. Of course, the numbers will be different. But not all of them, pi will still be 3.14159....

- http://www.math.utah.edu/~cherk/mathjokes.html
1. Give the simplest exact answers to each of the following.
   a. \( \log_3 \frac{1}{27} = \)
   b. \( \log_b b^4 = \)
   c. \( \ln \sqrt{e} = \)
   d. \( \log 1 = \)
   e. \( e^{2\ln x} = \)

2. If \( \cot x = -\frac{12}{5} \) where \( \sec x < 0 \), find the exact values of all the trigonometric functions.
   
   \( \sin x = \) 
   \( \cos x = \) 
   \( \tan x = \) 
   \( \csc x = \) 
   \( \sec x = \) 

3. Prove (verify) the trigonometric identity: \( \sin x \sin 2x = 2\cos x - 2\cos^3 x \).
   
   \( \sin x \sin 2x = \)
4. If \( \ln 2 = p \), \( \ln 3 = r \), and \( \ln 5 = t \), evaluate and simplify \( \log_5 \frac{8}{9} \) in terms of \( p \), \( r \), and \( t \).

\[
\log_5 \frac{8}{9} = ______________
\]

**5-point Bonus:** Algebraically find the range in interval notation of the function \( y = \frac{x + 10}{x - 2} \).

Range in interval notation: ______________________________

5. Exactly solve \( \log_2 (x + 1) = 4 - \log_2 (x - 5) \) for \( x \).

\[
x = ______________________________
\]

6. Problem: How many pounds of a 50% wildflower mix would Elizabeth need to combine together with a 25% wildflower mix to obtain 80 pounds of a 40% wildflower mix?

a. If \( x \) is the pounds of 50% wildflower mix and \( y \) is the pounds of 25% wildflower mix, give two equations that can be used to solve this problem.

b. Solve the system of equations:

c. Answer: Pounds of 50% wildflower mix needed: ______________________________ pounds
7. In interval notation, what is the domain of the function \( f(x) = \frac{\sqrt{x-4}}{\log_{11}(18-x)} \)?

Domain in interval notation: ________________________

8. Given the function \( f(x) = \frac{x^3 + 4x^2 - x - 4}{x^2 - x - 20} \), find the horizontal and vertical asymptotes, hole(s) and the \( y \)-intercept(s). Write “none,” if there are none.

Horizontal asymptote(s): _____________________________

Vertical asymptote(s): _____________________________

Hole(s) as a POINT: _____________________________

\( y \)-intercept as a POINT: _____________________________

9. Write a function of the form \( f(x) = a \sin k(x-b) + c \), whose graph is shown below, where \( a, k, \) and \( b \) are positive, and \( b \) is as small as possible.

\[ f(x) = \] _____________________________

10. If a circle has a 24 cm diameter, find the exact arc length and sector area subtended by a central angle of \( \frac{5\pi}{6} \). Remember your units!

Arc length: _____________________________

Sector area: _____________________________