Prince Sultan University
Department of Mathematical Sciences

MATH 002
Major IA Examination
Semester II, Term 162
Tuesday, March 28, 2017
Time Allowed: 90 minutes

Student Name: _____

Student ID #: _____ Section #: _____

Teacher's Name: _____

Important Instructions:

1. You may use a scientific calculator that does not have programming or graphing capabilities.
2. You may NOT borrow a calculator from anyone.
3. You may NOT use notes or any textbook.
4. There should be NO talking during the examination.
5. Your exam will be taken immediately if your mobile phone is seen or heard.
6. Looking around or making an attempt of cheating may cause you expulsion from the Exam.
7. This examination has 13 problems, some with several parts and a total of 5 pages including the cover page. Make sure your exam paper has all these pages with all the problems.

Problems	Max points	Student's Points
1	10	
2 , 3	13	
4 , 5 , 6 , 7	19	
8 , 9 , 10	18	
11 , 12 , 13	18	
Total	80	

20

Q.1 (10 points)A: Circle the correct answer

1) Find the reference angle for $\theta = -\frac{28\pi}{3}$

a) $\frac{2\pi}{3}$ b) $\frac{\pi}{3}$ c) $\frac{4\pi}{3}$ d) $-\frac{\pi}{3}$

2) If $\cos\theta > 0$ and $\tan\theta < 0$. Determine the quadrant where θ lies.

a) *QIV* b) *QIII* c) *QII* d) *QI*

3) Find the value of the trigonometric function $\csc(\frac{17\pi}{6})$.

a) 2 b) 6.463 c) $\sqrt{3}$ d) –6.463

4) The domain of $f(x) = \log_2(3x - 6)$ is:

a) $(6, \infty)$ b) $(-2, \infty)$ c) $[2, \infty)$ d) $(2, \infty)$

5) Find a cofunction with the same value as the given expression: $\sec 24^\circ$

a) $\cos 66^\circ$ b) $\cos 24^\circ$ c) $\csc 66^\circ$ d) $\csc 66^\circ$

6) Solve $\left(\frac{3}{4}\right)^x = \frac{27}{64}$ for x.

a) 4 b) 3 c) 5 d) 2

7) Write $x^4 = 12.35$ in logarithmic form;

a) $\log_x 12.35 = 4$ b) $\log_{12.35} x = 4$ c) $\log_4 x = 12.35$ d) $\ln_4 12.35 = x$

8) Find two conterminal angles (one positive and one negative) for $\theta = 25^\circ$

a) 385° , -385° b) 385° , -335° c) 205° , -155° d) 325° , -335°

9) Let $(-3, 4)$ be a point on the terminal side of angle θ. Find $\sin\theta$

a) $\sin\theta = \frac{\sqrt{7}}{4}$ b) $\sin\theta = -\frac{4}{5}$ c) $\sin\theta = \frac{4}{5}$ d) $\sin\theta = -\frac{3}{5}$

10) Solve $6 + 2\ln x = 24$

a) 9 b) e^{18} c) $\ln 9$ d) e^9

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Teacher's Name: _____

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11. There should be NO talking during the examination.
12. Your exam will be taken immediately if your mobile phone is seen or heard.
13. Looking around or making an attempt of cheating may cause you expulsion from the Exam.
14. This examination has 13 problems, some with several parts and a total of 6 pages including the cover page. Make sure your exam paper has all these pages with all the problems.

Problems	Max points	Student's Points
1	10	
2 , 3	13	
4 , 5 , 6 , 7	21	
8 , 9 , 10	18	
11 , 12 , 13	18	
Total	80	

20

Q.1 (10 points)B: Circle the correct answer

1) Solve $\left(\frac{3}{4}\right)^{x} = \frac{27}{64}$ for x.

a) 2 b) 5 c) 4 d) 3

2) Solve $6 + 2\ln x = 24$

a) e^{9} b) $\ln 9$ c) e^{18} d) 9

3) Find the value of the trigonometric function $\csc(\frac{17\pi}{6})$.

a) -6.463 b) 2 c) 6.463 d) $\sqrt{3}$

4) Write $x^{4} = 12.35$ in logarithmic form;

a) $\log_{12.35} x = 4$ b) $\log_{4} x = 12.35$ c) $\ln_{4} 12.35 = x$ d) $\log_{x} 12.35 = 4$

5) The domain of $f(x) = \log_{2}(3x - 6)$ is:

a) $[2, \infty)$ b) $(2, \infty)$ c) $(6, \infty)$ d) $(-2, \infty)$

6) If $\cos\theta > 0$ and $\tan\theta < 0$. Determine the quadrant where θ lies.

a) *QI* b) *QII* c) *QIII* d) *QIV*

7) Find the reference angle for $\theta = -\frac{28\pi}{3}$

a) $\frac{\pi}{3}$ b) $\frac{2\pi}{3}$ c) $-\frac{\pi}{3}$ d) $\frac{4\pi}{3}$

8) Find a cofunction with the same value as the given expression: $\sec 24^{\circ}$

a) $\cos 24^{\circ}$ b) $\csc 66^{\circ}$ c) $\csc 66^{\circ}$ d) $\cos 66^{\circ}$

9) Find two conterminal angles (one positive and one negative) for $\theta = 25^{\circ}$

a) 385° , -385° b) 385° , -335° c) 205° , -155° d) 325° , -335°

10) Let $(-3, 4)$ be a point on the terminal side of angle θ. Find $\sin\theta$

a) $\sin\theta = \frac{4}{5}$ b) $\sin\theta = -\frac{\sqrt{7}}{4}$ c) $\sin\theta = -\frac{3}{5}$ d) $\sin\theta = -\frac{4}{5}$

Q.2 (3+3+4 points): Solve. Find the solution set for each of the following equations.
(Round your answer to two decimal places)

a) $2e^{3x-8}-3=45$

b) $\frac{1}{9^x}=3^{2-x}$

c) $\log_5(x-7)+\log_5(x-4)-\log_5(x)=1$

Q.3 (3 points): Let $\log_b 3=d$ and $\log_b 2=c$. Write the expression: $\log_b\sqrt{\frac{32}{3}}$ in terms of c and d

Q.4 (3 points): Use properties of logarithms to condense the logarithmic expression. Write the expression as a single logarithm(**simplify your answer**)

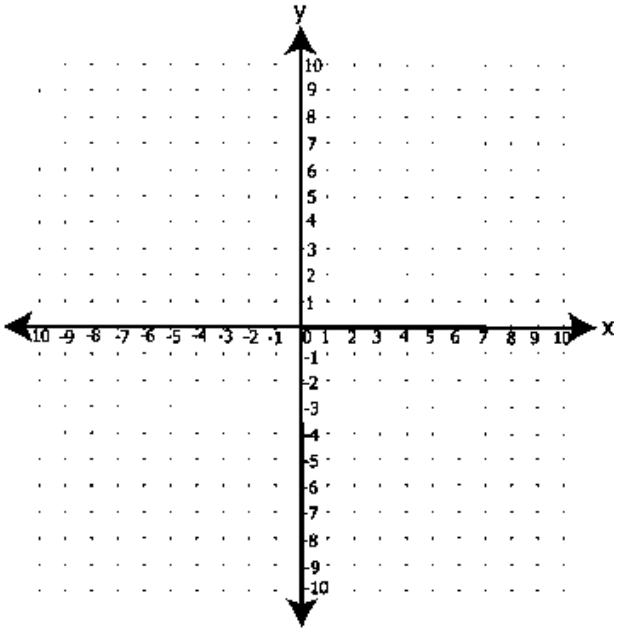
$$\frac{1}{3}\left[2\ln(x+3)-\ln x-\ln(x^2-25)\right]$$

Q.5 (4 points): Use properties of logarithms to expand the logarithmic expression as much as possible.

$$\log_b\left(\frac{\sqrt[3]{x}.y^4}{z^5}\right)^7$$

Q.6 (7 points): Consider the function $f(x)=-\left(\frac{1}{3}\right)^{x-1}+3$

a) Find the y-intercept



b) Find the horizontal and/or vertical asymptote

c) Find the range of f

d) Sketch the graph of f .Show the horizontal and/or vertical asymptotes, if any.

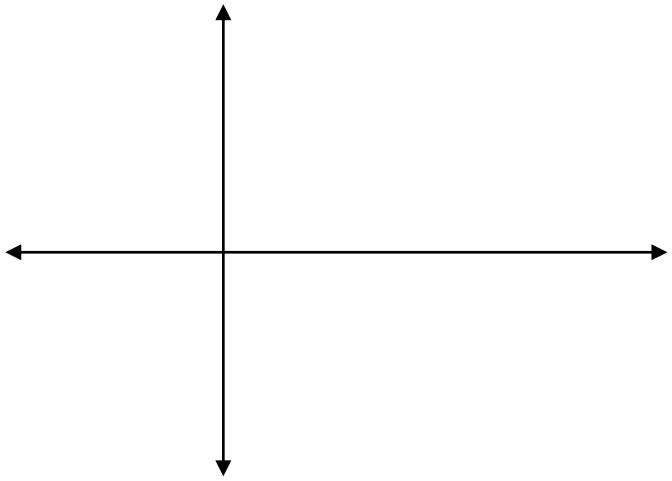
Q.7 (3+2+2points): Find the **domain (values of x) .**

a) $f(x)=\ln(x-6)^2$

b) $f(x)=\cos\left(\cos^{-1}(x)\right)$

c) $f(x)=\sin^{-1}\left(\sin(x)\right)$

Q.8 (8 points): Determine the amplitude, period, and phase shift, and then sketch the graph of one period. $f(x) = -5\cos\left(\frac{1}{2}x - \frac{\pi}{2}\right)$



Q.9 (4 points): Use a right triangle to find the exact value of $\tan\left(\cos^{-1}(-\frac{3}{8})\right)$

(Don't use a calculator and show your steps)

Q.10 (6 points): Given that $\cos\theta = -\frac{2}{9}$ and $\tan\theta > 0$. Find the exact value of each of the remaining trigonometric functions.

Q.11 (12 points): Find the **exact** value. (**Show your work and do not use a calculator**)

a) $\tan\left(\frac{23\pi}{6}\right)$

b) $\sin(-240^\circ)$

c) $\cot\left(-\frac{11\pi}{4}\right)$

d) $\sin^{-1}(\sin\frac{13\pi}{6})$

Q.12 (3 points): Students are given a Math exam every month to see how much of the course content they remember over time. The average score for the group, $f(t)$,after t months was modeled by the function $f(t)=79-13\ln(t+1)$.What was the average score after 5 months?

Q.13 (3 points) A plane rises from take-off and flies at an angle of 5° with the horizontal runway. **Find the height** of the plane after it has flown for a distance of 25000 feet.