Prince Sultan University

Deanship of Educational Services

Department of Mathematics and General Sciences

COURSE DETAILS:

ORIENTATION MATHEMATICS I	MATH 002	MAJOR EXAM I	A
Semester:	Spring Semester --Term 182		
Date:	Sunday February 24, 2019		
Time Allowed:	90 minutes		

STUDENT DETAILS:

Student Name:	
Student ID Number:	
Section:	
Instructor's Name:	

INSTRUCTIONS:

- You may use a scientific calculator that does not have programming or graphing capabilities. NO borrowing calculators.
- NO talking or looking around during the examination.
- NO mobile phones. If your mobile is seen or heard, your exam will be taken immediately.
- Show all your work and be organized.
- You may use the back of the pages for extra space, but be sure to indicate that on the page with the problem.

GRADING:

	Page 1	Page 2	Page 3	Page 4	Page 5	Total	Total
Questions							
Marks	10	10	20	20	20	80	20

Q.1A (20 points) Choose the correct answer

1. A 69-ft tree casts a shadow that is 100 ft long. What is the angle of elevation of the sun?

   A) $46.37°$

   B) $25.26°$

   C) $43.63°$

   D) $34.61°$

2. Determine the **domain** and the **asymptote** of the function $h(x) = \ln(x-2) + 3$

   A) Domain: $(2,\infty)$; Asymptote: $x = 3$
   B) Domain: $(2,\infty)$; Asymptote: $y = 3$
   C) Domain: $(3,\infty)$; Asymptote: $x = -2$
   D) Domain: $(2,\infty)$; Asymptote: $x = 2$

3. Find the degree measure of the angle: $\theta = 2.6$ rad.

   A) $148.97°$

   B) $0.05°$

   C) $74.48°$

   D) $234°$

4. Express the equation $2\log_a b = c$ in exponential form.

   A) $a^c = b^2$
   B) $a^c = \dfrac{b}{2}$
   C) $a^b = \dfrac{c}{2}$
   D) $c^a = 2b$

5. Rewrite the expression $\dfrac{1}{7}\left(\ln 2 + \ln a^3 - \ln b\right)$ as a single logarithm.

   A) $\ln\left(2 + a^3 - b\right)^{\frac{1}{7}}$

   B) $\ln\left(\dfrac{2}{7} + \dfrac{a^3}{7} - \dfrac{b}{7}\right)$

   C) $\ln \sqrt[7]{\dfrac{2a^3}{b}}$

   D) $\dfrac{2}{7}\ln \sqrt{a^3 - b}$

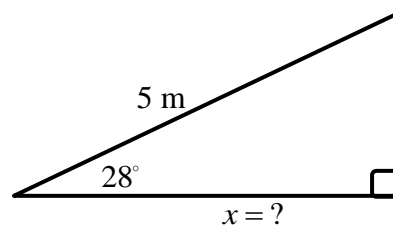*You must write the correct answer to each question in the box below*

Question	1	2	3	4	5
Answer					

6. Suppose that a point $P\left(\dfrac{2\sqrt{10}}{7}, y\right)$ is on the unit circle in Quadrant IV. The missing coordinate y is:

A) $\dfrac{3}{7}$

B) $-\dfrac{5}{7}$

C) $-\dfrac{3}{7}$

D) $-\dfrac{4}{7}$

7. Find the value of x in the triangle on the right.

A) 5.7 m

B) 2.7 m

C) 2.3 m

D) 4.4 m

5 m

28°

$x = ?$

8. Find one negative and one positive conterminal angle for $\theta = 35°$.

A) $-145°$, $395°$

B) $-235°$, $205°$

C) $-325°$, $395°$

D) $-55°$, $205°$

9. Find the length of the arc on a circle of radius 25 meters intercepted by a $144°$ central angle,

A) 20.00 m

B) 62.83 m

C) 58.27 m

D) 314.16 m

10. Which of the following is equivalent to $\log_{63} 36$

E)   A) $\dfrac{\log_2 36}{\log_2 63}$ B) $\dfrac{\log_2 63}{\log_2 36}$ C) $\dfrac{\log_{36} 36}{\log_{63} 63}$ D) $\dfrac{\log_{63} 36}{\log_{36} 63}$

You must write the correct answer to each question in the box below

Question	6	7	8	9	10
Answer					

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Q.1B (20 points)   **Choose the correct answer**

1. Suppose that a point $P\left(\dfrac{2\sqrt{10}}{7}, y\right)$ is on the unit circle in Quadrant IV. The missing coordinate y is:
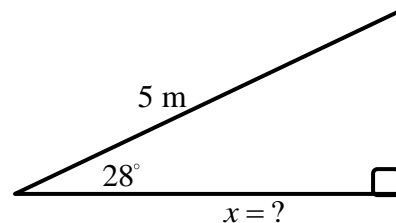
   A) $-\dfrac{5}{7}$

   B) $\dfrac{3}{7}$

   C) $-\dfrac{4}{7}$

   D) $-\dfrac{3}{7}$

2. Find one negative and one positive conterminal angle for $\theta = 35°$.

   A) $-235°$, $205°$

   B) $-55°$, $205°$

   C) $-145°$, $395°$

   D) $-325°$, $395°$

3. Find the value of x in the triangle on the right.

   A) 2.3 m

   B) 4.4 m

   C) 5.7 m

   D) 2.7 m

4. Which of the following is equivalent to $\log_{63} 36$

   A) $\dfrac{\log_{63} 36}{\log_{36} 63}$ B) $\dfrac{\log_{2} 63}{\log_{2} 36}$ C) $\dfrac{\log_{2} 36}{\log_{2} 63}$ D) $\dfrac{\log_{36} 36}{\log_{63} 63}$

5. Find the length of the arc on a circle of radius 25 meters intercepted by a $144°$ central angle,

   A) 62.83 m

   B) 20.00 m

   C) 58.27 m

   D) 314.16 m

You must write the correct answer to each question in the box below

Question	1	2	3	4	5
Answer					

6B. Express the equation $2\log_a b = c$ in exponential form.

    A) $c^a = 2b$

    B) $a^c = b^2$

    C) $a^c = \dfrac{b}{2}$

    D) $a^b = \dfrac{c}{2}$

7. Rewrite the expression $\dfrac{1}{7}\left(\ln 2 + \ln a^3 - \ln b\right)$ as a single logarithm.

    A) $\ln\left(\dfrac{2}{7} + \dfrac{a^3}{7} - \dfrac{b}{7}\right)$

    B) $\dfrac{2}{7}\ln\sqrt{a^3 - b}$

    C) $\ln\left(2 + a^3 - b\right)^{\frac{1}{7}}$

    D) $\ln\sqrt[7]{\dfrac{2a^3}{b}}$

8. Determine the **domain** and the **asymptote** of the function $h(x) = \ln(x - 2) + 3$

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10. Find the degree measure of the angle: $\theta = 2.6$ rad.

    A) 234°

    B) 148.97°

    C) 74.48°

    D) 0.05°

You must write the correct answer to each question in the box below

| Question	6	7	8	9	10
Answer					

Q.2 (6 points): The terminal point $P\left(-\dfrac{\sqrt{3}}{3},\dfrac{\sqrt{6}}{3}\right)$ on the unit circle is determined by a number t. Find

the six trigonometric functions of t.

Q.3 (8 points): Find the **amplitude, period, and the horizontal shift** of the function below and

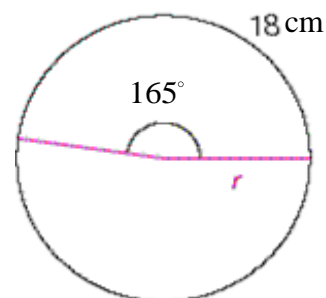**sketch** its graph over one period. $y=-\dfrac{4}{5}\sin\left(2x-\dfrac{\pi}{2}\right)$
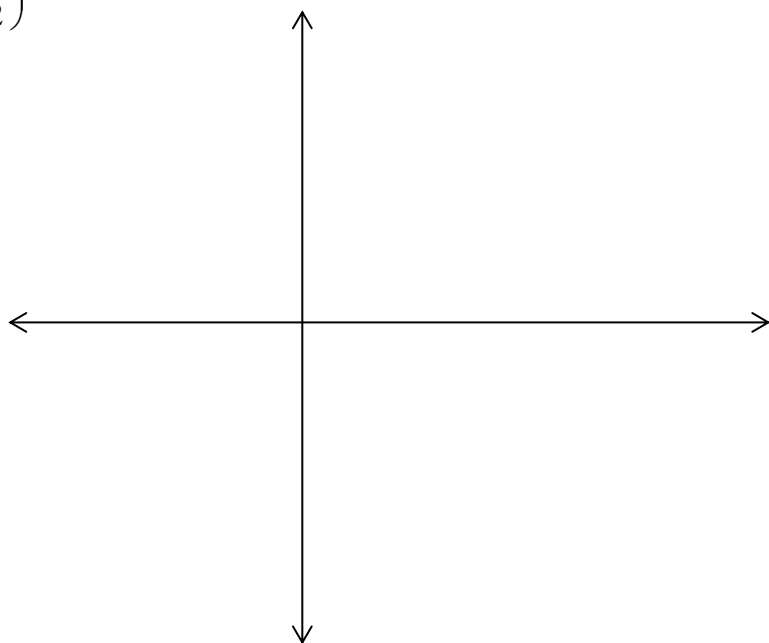
Q.4 (6 points): Sketch the graph $f(x)=-e^{x-1}+2$ and give the **equation of the asymptote** and the
domain and **range** of $f(x)$.

6
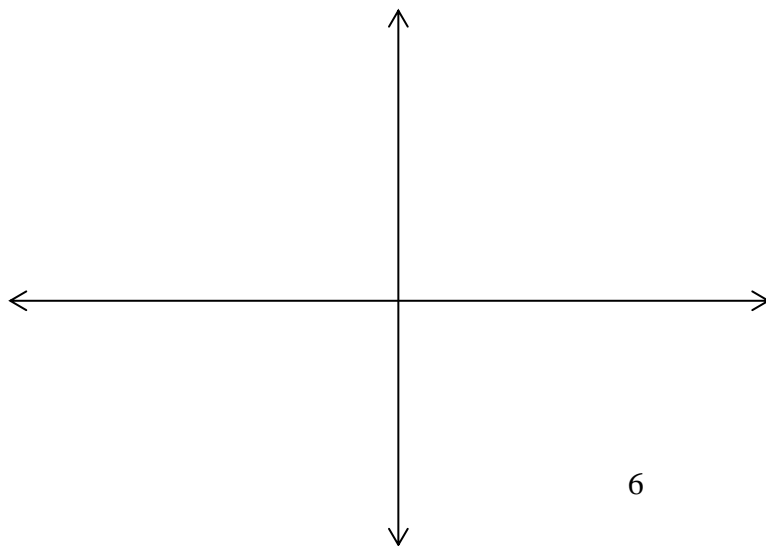
Q.5 (4 points): Combine the following logarithmic expression into a single log. **Simplify** where possible. $\dfrac{1}{3}\log(x+2)^3 + \dfrac{1}{2}\left[\log x^4 - \log(x^2-x-6)^2\right]$

Q.6 (4 points): Find the radius r of the circle in the figure.
(Round your answer to one decimal place)

Q.7 (12 points) : Solve the following equations:

a) $8^x = 4^{x+1}$

b) $3^{4x} - 3^{2x} - 6 = 0$

c) $\log_5(x+1) - \log_5(x-1) = 2$

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Q.8 (6 points): Complete the following table.

	Trigonometric Function of angle θ	Reference angle, $\bar{\theta}$	Quadrant in which angle θ lies	Value of the trigonometric function
1	$\tan(300°)$			
2	$\sec\left(-\dfrac{17\pi}{3}\right)$			

Q.9 (6 points): Find the exact values of the remaining trigonometric functions of θ given that:
$\sec\theta = 7$ and $\sin\theta < 0$

Q.10 (4 points): Find the value of angle θ in degrees, rounded to one decimal place.
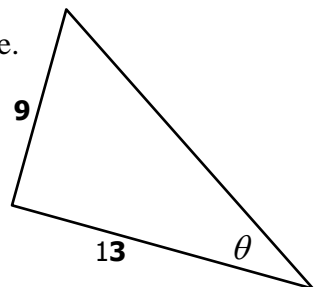
Q.11 (4 points): Find the exact value of the expression. (**Use a sketch and show all your steps**)

$\tan\left(\sin^{-1}(-\dfrac{5}{8})\right)$