King Fahd University of Petroleum and Minerals
Prep-Year Math Program

Prep-Year Math II
FIRST EXAM
Semester I, Term 061
Saturday, October 7, 2006
Net Time Allowed: 75 minutes

MASTER VERSION

"Sources"

1. The graph of the function $f(x) = -\ln|x+1|$ lies above the x-axis over the interval

(a) $(-2,-1) \cup (-1,0)$ See Example 6 P. 388

(b) $(-\infty,-2)$ See Problems # 67 and 68 P. 392

(c) $(-\infty,-1)$

(d) $(-1,\infty)$

(e) $(-\infty,-2) \cup (0,\infty)$

2. The solution set of the equation

$$\log(x-4) - \log(3x-10) = -\log x$$

contains

See Example 7 P. 412
See Problems 21 to 30 P. 415

(a) one positive integer

(b) two positive integers

(c) two positive irrational numbers

(d) one positive irrational number

(e) no real numbers

3. $\log_2 x^3y^2 - 2\log_2 x\sqrt[3]{y} + 3\log_2 \frac{x}{y} =$

(a) $\log_2 \frac{x^4}{y^{5/3}}$

(b) $\log_2 \frac{x^4}{y^{2/3}}$

(c) $\log_2 \frac{x^2}{y^{5/3}}$

(d) $\log_2 \frac{x^2}{y^{1/3}}$

(e) $\log_2 \frac{x^3}{y^{5/3}}$

See Example 2 p. 396
See Problems #9 & 14 p. 403-404

4. If $x = e^{(-\ln 3 + 2\ln 5)}$ and $y = \ln \sqrt[4]{e^5}$, then $x + y =$

(a) $\frac{115}{12}$

(b) $\frac{101}{12}$

(c) $\frac{30}{7}$

(d) $\frac{100}{11}$

(e) $\frac{100}{7}$

See Example 3 p. 385
and the definitions and the inverse formulas on p. 383.

5. If $\cot\theta = \frac{1}{2}$, $\pi < \theta < \frac{3\pi}{2}$, then $\sin\theta + \cos\theta =$

See problems # 15 to 24 P. 497

(a) $\frac{-3}{\sqrt{5}}$

(b) 3

(c) $\frac{-1}{\sqrt{5}}$

(d) $\frac{3}{\sqrt{5}}$

(e) $\frac{1}{\sqrt{5}}$

6. Which one of the following statements is **FALSE** about the function $f(x) = -1 + \left(\frac{1}{2}\right)^{-x+3}$?

See Examples 2 and 3 P. 371

See problems # 17 to 34 P. 377

(a) decreasing on $(-\infty, \infty)$

(b) increasing on $(-\infty, \infty)$

(c) f is a one-to-one function

(d) the range of f is $(-1, \infty)$

(e) the graph of f is asymptotic to $y = -1$

7. Let $W(t)$ be the wrapping function. If $W\left(-\frac{11\pi}{6}\right) = (a, b)$ and $W\left(\frac{10\pi}{3}\right) = (c, d)$, then $a + d =$

See Example 1 P. 500

See Problems 1 to 10 P. 508

~~(a)~~ 0

(b) $\sqrt{3}$

(c) $\frac{-1}{2} - \frac{\sqrt{3}}{2}$

(d) $-\sqrt{3}$

(e) $\frac{1}{2} - \frac{\sqrt{3}}{2}$

8. The smallest positive angle coterminal with the angle $(820.25)^\circ$ is

See Problems # 19 to 24 P. 473

~~(a)~~ $100^\circ\ 15'$

(b) $20^\circ\ 52'$

(c) $100^\circ\ 15'\ 2''$

(d) $20^\circ\ 50'\ 2''$

(e) $100^\circ\ 15'\ 1''$

9. An arc of length 150 m subtends a central angle of $300°$ in a circle of radius r. The radius r is equal to

See Example 5 P. 469
See Problems 59 & 64 P. 473

~~(a)~~ $\frac{90}{\pi}$ m

(b) $\frac{1}{2}$ m

(c) $\frac{\pi}{90}$ m

(d) $\frac{180}{\pi}$ m

(e) 2500π m

10. The exact value of $\csc(225°) \cdot \tan(-240°) + \sin 150°$ is

See Example 4 P. 495
See Problems 37 & 48 P. 497

~~(a)~~ $\frac{1}{2} + \sqrt{6}$

(b) $\sqrt{3} + \frac{1}{2}$

(c) $\frac{\sqrt{2} + 2\sqrt{3}}{\sqrt{3}}$

(d) $\frac{\sqrt{6} + 4\sqrt{3}}{\sqrt{2}}$

(e) $\sqrt{6} + 2\sqrt{3}$

11. From the top of a 200-ft lighthouse, the angle of depression to a ship in the sea is 60°. How far is the ship from the base of the lighthouse?

(a) $\frac{200\sqrt{3}}{3}$ ft

(b) 400 ft

(c) $200\sqrt{3}$ ft

(d) $\frac{400\sqrt{3}}{3}$ ft

(e) $400\sqrt{3}$ ft

See Examples 4 and 5 P. 482-483
See Problems # 65 and 66 P. 486

12. If $\cos 170° = k$, then $\cos 350° + 2\sec 190° =$

(a) $\frac{2-k^2}{k}$

(b) $\frac{2k^2+k}{k}$

(c) $-3k$

(d) $\frac{k^2-2}{k}$

(e) $-k+2\sqrt{1-k^2}$

An Application of the Concept of "Reference Angles" P. 493
See Example 3 P. 494
See Problems 25 to 36 P. 497

13. If $\log_a 2 = 0.6$, then $\log_{2a}\left(\frac{a^2}{\sqrt{2}}\right)$ is equal to

(a) $\frac{17}{16}$

(b) $\frac{16}{17}$

(c) $\frac{15}{17}$

(d) $\frac{17}{15}$

(e) $\frac{16}{15}$

An Application of "Change of Base Formula" P. 397

See Example 3 P. 397

See Problems 15 to 22 P. 404

14. The domain, in interval notation, of the function $f(x) = \sqrt{\ln(x-3)}$ is equal to

(a) $[4, \infty)$

(b) $(3, \infty)$

(c) $(3, 4]$

(d) $(-\infty, 3)$

(e) $(0, 3)$

See Example 5 P. 388

See Problems # 39 to 45 P. 391

15. If $3 \cdot 2^x = 2 \cdot 3^{x+1}$, then $x =$

(a) $\dfrac{\ln 2}{\ln(2/3)}$

(b) $\dfrac{\ln 3}{\ln 6}$

(c) $\dfrac{\ln 2}{\ln 3}$

(d) $\dfrac{\ln 3}{\ln(3/2)}$

(e) $\dfrac{\ln 2}{\ln 6}$

See Example 3 p. 410

See Problems #17 to 20 p. 415