Purdue University Examination

MATH 161 EXAM 1, SPRING 2007

Name: _____ , _____
(Last name) (First name)

10-digit PUID Number: _____

Lecturer: _____

Recitation Instructor: _____

Recitation Time: _____

INSTRUCTIONS:

1. This package contains 14 problems worth 7 points each.
2. Please supply all information requested above and on the scantron sheet. Use a #2 pencil on the scantron sheet to fill in the corresponding circles. You get 2 points for supplying all information correctly.
3. Work only in the space provided, or on the backside of the pages. Circle your choice for each problem in this booklet, and mark your answer on the scantron sheet.
4. No books, notes, calculator or any electronic devices may be used on the exam.

1 B 2 B 3 D 4 E 5 B 6 C 7 C

8 C 9 D 10 A 11 E 12 D 13 E 14 B

1. The radius of the circle $x^2 + 2x + y^2 - 4y = 0$ is

   A. 5 B. $\sqrt{5}$ C. 3 D. $\sqrt{3}$ E. 0

2. Let L be the line that passes through the points $(0, 2)$ and $(4, 5)$. Which of the following lines is parallel to L?

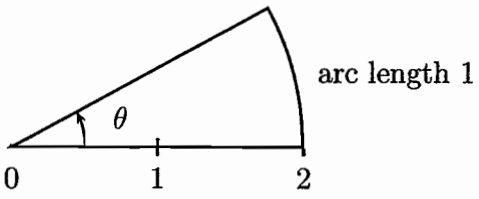
   I. The line through $(1, 1)$ and $(3, 4)$.

   II. The line with equation $3x - 4y = 0$.

   III. The line through $(3, 4)$, perpendicular to the line $y = x + 4$.

   A. Only I B. Only II C. Only III D. Only I and II E. Neither

3. What is the angle θ shown below?



A. 45°

B. $\pi/4$ radians

C. $\pi/8$ radians

D. 1/2 radian

E. 30°

4. What is the domain of the function $\dfrac{1}{x^2 - |x|}$?

A. $(-\infty, 0) \cup (0, \infty)$

B. $(-\infty, 0) \cup (0, 1) \cup (1, \infty)$

C. $(-\infty, -1) \cup (-1, 1) \cup (1, \infty)$

D. $(-\infty, -1) \cup (1, \infty)$

E. $(-\infty, -1) \cup (-1, 0) \cup (0, 1) \cup (1, \infty)$

5. Let $f(x) = (\sin x)^2$ and $g(x) = \sin(x^2)$. Which is true for all real x?

   I. $f(x + 2\pi) = f(x)$.

   II. $g(x + 2\pi) = g(x)$.

   A. Both are true

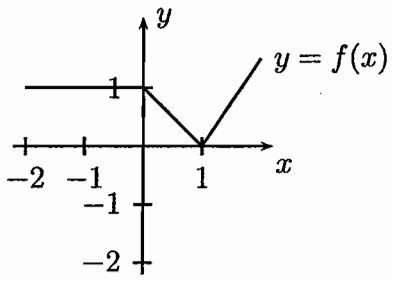
   B. Only I is true

   C. Only II is true

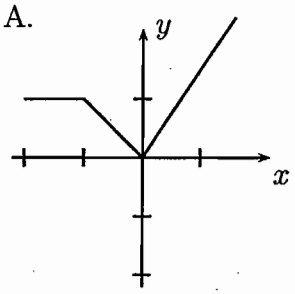
   D. Neither of the two is true

   E. None of the above answers is correct

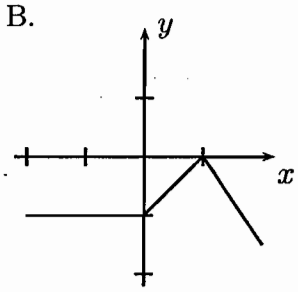
6. The graph of $y = f(x)$ is shown below. Which is the graph for $y = -f(x + 1)$?



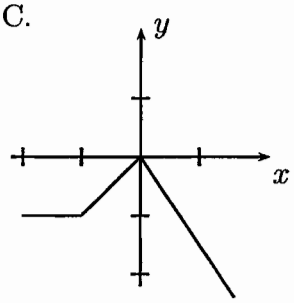
A.



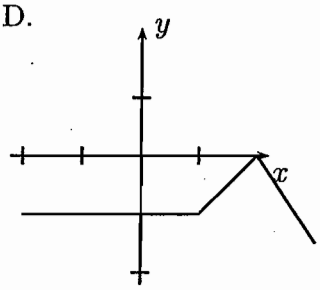
B.



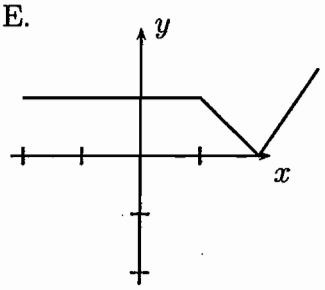
C.



D.



E.



7. The solution of the equation

$$\frac{2^x 2^5}{2^6} - 2 = 14$$

is $x =$

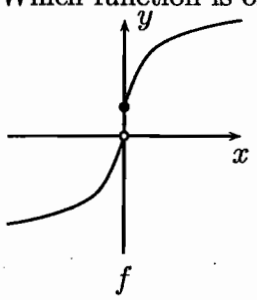
A. 7 B. 2 and 7 C. 5 D. 6 E. 4 and 5

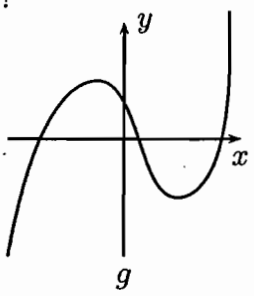
8. Which of the following numbers is in the range of $2^{\cos x}$?

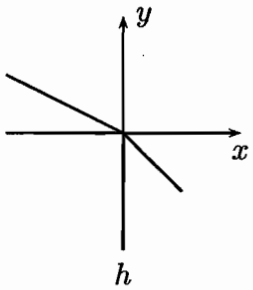
I. 0 II. 1/4 III. 1/2

A. Only I B. Only II C. Only III D. Only II and III E. All are

9. Which function is one-to-one?







A. Only f B. Only g C. Only h D. Only f and h E. Only g and h

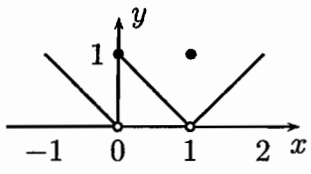
10. The inverse of the function $\varphi(x) = \sqrt[3]{1-x^3}$ is

A. $\sqrt[3]{1-x^3}$ B. $(1-\sqrt[3]{x})^3$ C. $(1+\sqrt[3]{x})^3$ D. $\log_{1-x^3}\frac{1}{3}$ E. None of the above

11. if $x > 1$, then $(\log_x x^3)(\ln ex) =$

A. $\ln(x^3 + e^x)$ B. $\log_x(x^3 + e^x)$ C. $\ln(ex^4)$ D. $4 + \ln x$ E. $3 + \ln(x^3)$

12. For the function F pictured, which is true?



I. $\lim_{x \to 0} F(x) = 1.$

II. $\lim_{x \to 0^-} F(x) = 0.$

III. $\lim_{x \to 1} F(x) = 0.$

A. Only I B. Only II C. Only I and II D. Only II and III E. All are true

13. $\lim_{x\to 2} \dfrac{\frac{1}{4} - \frac{1}{x^2}}{x-2} =$

A. ∞ B. $-\infty$ C. 1 D. 1/2 E. 1/4

14. The function

$$\psi(x) = \begin{cases} x^2 & \text{if} \quad x < 0 \\ x & \text{if} \quad 0 \le x < 1 \\ 1-x & \text{if} \quad 1 \le x \end{cases}$$

is discontinuous

A. Only at 0 B. Only at 1 C. Only at 0 and 1

D. only at 0, 1/2 and 1 E. The function is everywhere continuous