STUDENT NAME _____

STUDENT ID _____

LECTURE TIME _____

RECITATION INSTRUCTOR _____

RECITATION TIME _____

INSTRUCTIONS

1. Fill in all the information requested above and the test number of the test on your scantron sheet.

2. This booklet contains 14 problems, each worth 7 points. There are two free points. The maximum score is 100 points.

3. For each problem mark your answer on the scantron sheet and also circle it in this booklet.

4. Work only on the pages of this booklet.

5. Books, notes, calculators are not to be used on this test.

6. At the end turn in your exam and scantron sheet to your recitation instructor.

1. Find the center of the circle $6x^2 + 6y^2 + 3x - 2y = 0$.

   A. $\left(\dfrac{3}{2}, -1\right)$

   B. $\left(-\dfrac{3}{2}, 1\right)$

   C. $\left(\dfrac{1}{2}, -\dfrac{1}{3}\right)$

   D. $\left(-\dfrac{1}{4}, \dfrac{1}{6}\right)$

   E. $\left(-\dfrac{1}{2}, \dfrac{1}{3}\right)$

2. If $\dfrac{3\pi}{2} < \theta < 2\pi$ and $\cos\theta = \dfrac{2}{3}$, find $\tan\theta$.

   A. $\dfrac{2}{\sqrt{5}}$

   B. $-\dfrac{2}{\sqrt{5}}$

   C. $-\dfrac{\sqrt{5}}{2}$

   D. $\dfrac{\sqrt{5}}{2}$

   E. $-\dfrac{\sqrt{5}}{3}$

3. If $f(x) = \dfrac{2x^3}{x^2+1}$ and $g(x) = \dfrac{x^2-1}{2|x|+1}$, which statement is true?

   A. f is even and g is odd.

   B. f and g are both even.

   C. f is odd and g is even.

   D. f and g are both odd.

   E. g is neither even nor odd.

4. Which statement is false?

   A. The domain of $x^{\frac{1}{3}}$ is the set of all real numbers.

   B. The function $\left(\dfrac{1}{2}\right)^x$ is increasing.

   C. $\tan(x + \pi) = \tan x$ for all x in the domain of $\tan x$

   D. The function $\sec x$ is even.

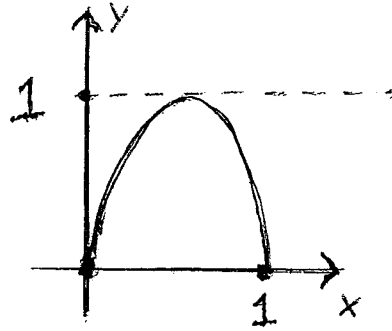   E. When $1 < a$, the range of the function a^x is all positive numbers.

5. Find the domain of $\dfrac{\ln(4 - x^2)}{x + 1}$.

   A. $(-2, 2)$

   B. $(0, 1) \cup (1, 2)$

   C. $(0, 2)$

   D. $(2, \infty)$

   E. $(-2, -1) \cup (-1, 2)$
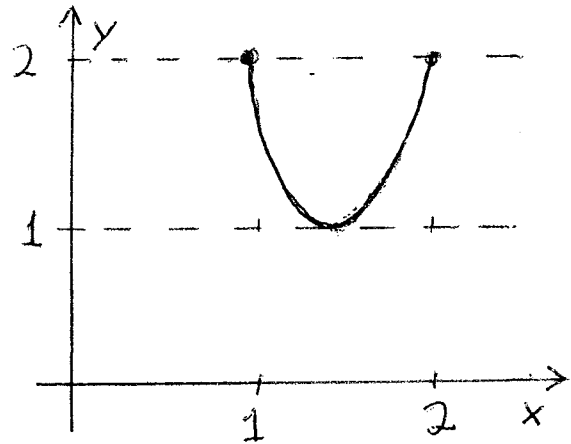
6. If the domain of a function f is the interval $(1, 3)$, find the domain of $f \circ g$ when $g(x) = 2x + 1$.

   A. $(0, 1)$

   B. $(3, 7)$

   C. $\left(\dfrac{1}{2}, \dfrac{3}{2}\right)$

   D. $\left(-\dfrac{1}{2}, 1\right)$

   E. $(0, 2)$

7. If the graph of $f(x)$ is

which function has the graph given by:

A. $1 + f(x - 1)$

B. $2 - f(x - 1)$

C. $2 - f(x + 1)$

D. $1 + f(x + 1)$

E. $2 - f(1 - x)$

8. The function $f(x) = \dfrac{4 - x^2}{x^3 - 2x^2 + x}$ has:

A. No vertical asymptotes

B. 1 vertical asymptote

C. 2 vertical asymptotes

D. 3 vertical asymptotes

E. 4 vertical asymptotes

9. A bacterial culture starts with 100 bacteria and triples every hour. What is the size of the population after 20 hours?

   A. $100 \cdot 2^{20}$

   B. $100 \cdot 2^{30}$

   C. $100 \cdot 6^{10}$

   D. $100 \cdot 6^{20}$

   E. $100 \cdot 9^{10}$

10. If $f(x) = (x^3 + 1)^{1/5}$, then $f^{-1}(x) =$

    A. $(x^3 + 1)^5$

    B. $(x^3 - 1)^5$

    C. $(x^5 - 1)^3$

    D. $(x^3 - 1)^{1/5}$

    E. $(x^5 - 1)^{1/3}$

11. Evaluate $\log_4 128 - \log_4 2$.

    A. 2

    B. 3

    C. 4

    D. 5

    E. 6

12. Let $f(x) = \begin{cases} -x, & \text{if } x < 0 \\ 1, & \text{if } x = 0 \\ 2x, & \text{if } 0 < x < 1 \\ 2x^2, & \text{if } 1 \le x \le 2 \\ 3, & \text{if } x > 2 \end{cases}$

    for what value of a does $\lim\limits_{x \to a} f(x)$ exist?

    A. all real numbers a

    B. all a except 0

    C. all a except 1

    D. all a except 2

    E. all a except 0 and 2

13. Evaluate $\displaystyle\lim_{x \to -3} \frac{\frac{1}{3} + \frac{1}{x}}{3 + x}$.

    A. $\dfrac{1}{9}$

    B. $\dfrac{1}{3}$

    C. $-\dfrac{1}{3}$

    D. $-\dfrac{1}{9}$

    E. $-\infty$

14. Evaluate $\displaystyle\lim_{x \to 1^+} (x-1)^2 \cdot \sin\left(\frac{1}{(x-1)^2}\right)$.

    A. ∞

    B. $-\infty$

    C. 0

    D. 1

    E. -1