NAME _____ YOUR TA'S NAME _____

STUDENT ID # _____ RECITATION TIME _____

Be sure the paper you are looking at right now is GREEN and matched with the color of the scantron! Write 11 in the TEST/QUIZ NUMBER boxes and blacken the appropriate spaces on the scantron. Use a #2 pencil for the scantron and fill in:

1. Your name. If there's not enough space, fill in as much as you can.

2. Section number. If you don't know your section number, ask your TA.

3. Test/Quiz number: 11

4. Student Identification Number: **Your Purdue ID Number with two leading zeros**

There are **12** questions, each worth 8 points (you will automatically earn 4 points for filling out your student ID number correctly). Blacken your answer choice on the scantron for questions 1-12. Use this exam booklet for all your work and use the back of the test pages for scrap paper. Submit both the scantron and the exam booklet when finished.

If you finish the exam before 8:50 PM, you may leave the room after turning in the scantron sheet and the exam booklet. You may not leave the room before 8:20 PM. If you don't finish by 8:50 PM, you MUST REMAIN SEATED until your TA collects your materials.

EXAM POLICIES

1. Students may not open the exam until instructed to do so.

2. Students must obey the orders and requests by all proctors, TAs, and lecturers.

3. No student may leave in the first 20 min or in the last 10 min of the exam.

4. Books, notes, calculators, or any electronic devices are not allowed on the exam, and they should not even be in sight in the exam room. Students may not look at anybody else's test, and may not communicate with anybody else except, if they have a question, with their TA or lecturer.

5. After time is called, the students have to put down all writing instruments and remain in their seats, while the TAs will collect the scantrons and the exams.

6. Any violation of these rules and any act of academic dishonesty may result in severe penalties. Additionally, all violators will be reported to the Office of the Dean of Students.

I have read and understand the exam rules stated above:

STUDENT SIGNATURE: _____

1. Evaluate the limit: $\displaystyle\lim_{x\to 0} \frac{\tan(7x)\cos(4x)}{\tan(4x)\cos(7x)}$

A. $\dfrac{49}{16}$

B. limit does not exist

C. $\dfrac{4}{7}$

D. $\dfrac{7}{4}$

E. $\dfrac{16}{49}$

2. Suppose $h(x) = f\big(g(x)\big)$, find $h'(3)$ with the help of the following data:

$f(2) = -3$	$f(3) = 2$
$f'(2) = 4$	$f'(3) = -2$
$g(2) = 3$	$g(3) = 2$
$g'(2) = 5$	$g'(3) = -5$

A. 20

B. -20

C. 10

D. -10

E. 40

3. Suppose $f(x) = e^{\sin(7x)}$. Find $f'(0)$.

    A. $7e$

    B. 0

    C. $f(x)$ is not differentiable at $x = 0$

    D. 1

    E. 7

4. Suppose $g(x) = \dfrac{x^3}{f^2(x)}$, $f(2) = 1$, $f'(2) = \dfrac{1}{2}$. Find $g'(2)$.

A. 4

B. -4

C. 0

D. 20

E. 1

5. Suppose $f(x) = \ln\left(\cos(x^3)\right)$, then $f'(x) =$

    A. $3x^2 \tan(x^3)$

    B. $-3x^2 \cot(x^3)$

    C. $-3x^2 \tan(x^3)$

    D. $\dfrac{3x^2}{\cos(x^3)}$

    E. $-3\tan x$

6. As a particle moves along a straight line, its position is described by the function $s(t) = \cos(t) - e^{-t}$. Find velocity of the particle when $t = 3\pi$.

A. $e^{3\pi}$

B. $1 - e^{-3\pi}$

C. $1 + e^{-3\pi}$

D. $-e^{-3\pi}$

E. $e^{-3\pi}$

7. Let $f(x) = \tan^{-1}(x^3 + 1)$. Then $f'(1) =$

A. $\dfrac{3}{4}$

B. $\dfrac{3}{5}$

C. $\dfrac{1}{2}$

D. 4

E. π

8. If $f(x) = 3^x + x^3$. Then $f'(x) =$

    A. $x3^{x-1} + 3x^2$

    B. $3^x \ln x + 3x^2$

    C. $(3^x + 3x^2) \ln x$

    D. $3^x \ln 3 + 3x^2$

    E. $\dfrac{3^x}{\ln 3} + 3x^2$

9. An inverted cone (that is, the point of the cone is at the bottom) has base radius of 4 feet and height 16 feet. Water is being pumped into it at a rate of 9 cubic feet per minute. How fast is the water level rising at a time when the water in the cone is 4 feet deep?

NOTE: the volume of a cone with base radius r and height h is $\frac{1}{3}\pi r^2 h$.

A. $\dfrac{16}{\pi}$ feet per minute

B. $\dfrac{3}{\pi}$ feet per minute

C. $\dfrac{4}{\pi}$ feet per minute

D. $\dfrac{9}{\pi}$ feet per minute

E. $\dfrac{8}{\pi}$ feet per minute

10. A particle moves along the graph of $y = \sqrt{25 - x^2}$. As it reaches the point $(3, 4)$, the y coordinate is decreasing at a rate of 1 unit per second. How is the x coordinate changing at that instant?

    A. increasing at a rate of $\dfrac{4}{3}$ units per second

    B. decreasing at a rate of $\dfrac{4}{3}$ units per second

    C. increasing at a rate of $\dfrac{3}{4}$ units per second

    D. decreasing at a rate of $\dfrac{3}{4}$ units per second

    E. increasing at a rate of 1 unit per second

11. Suppose that C is the curve defined by $3y^2 + xy^3 + x - 3 = 0$. Find an equation of the tangent line of C at the point $(0, 1)$.

A. $y = \dfrac{-1}{6}x + 1$

B. $y = \dfrac{1}{3}x + 1$

C. $y = 3x + 1$

D. $y = -2x + 1$

E. $y = \dfrac{-1}{3}x + 1$

12. Suppose $f(x) = \sin(x) + x^5 + x^3 + x + 1$, compute $(f^{-1})'(1)$.

A. $\dfrac{1}{\cos(1) + 1}$

B. $\dfrac{1}{\cos(1) + 9}$

C. $\dfrac{1}{2}$

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

E. $\cos(1) + 9$