Name_____**ID**_____

MATH 171   Section 501   **EXAM 2**   Spring 1998   P. Yasskin

Part I. Multiple Choice   (4 points each)   No Calculators   No part credit.

1. $\dfrac{d}{dx}[(e^x)^3] =$

   a. e^{x^3}

   b. e^{3x}

   c. $3e^{3x}$

   d. $3e^{2x}$

   e. None of these

2. The derivative of $\ln(4x)$ with respect to x is

   a. $\dfrac{4}{x}$

   b. $\dfrac{1}{x}$

   c. e^{4x}

   d. $\dfrac{1}{\ln(4x)}$

   e. None of these

3. Simplify $\log_5 10 + \log_5 20 - 3\log_5 2$

   a. 0

   b. 2

   c. $\log 5$

   d. $\log_5 24$

   e. $\log_5 \dfrac{100}{3}$

4. $\displaystyle\lim_{x\to\infty} \dfrac{\sin(5x)}{x} =$

   a. Does not exist

   b. 1

   c. 5π

   d. 5

   e. 0

1

5. $\dfrac{d^4}{dw^4}(\sin w) =$

   a. $\sin^4 w$

   b. $\sin w$

   c. $\cos w$

   d. $-\cos w$

   e. $\cos^4 w$

6. The radius of a circle is increasing at the rate of 3 m/s. At what rate is the area increasing when the area is 100π m^2 ?

   a. 300π m^2/s

   b. 3 m^2/s

   c. 60π m^2/s

   d. 30 m^2/s

   e. 6π m^2/s

7. $\dfrac{d}{dx}\ln(\sin^2(x^3))$

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

   b. $\dfrac{6}{\sin x^3}(\cos^2 x^3)x^3$

   c. $\dfrac{3}{\sin x^3}(\cos x^3)x^3$

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

   e. $\dfrac{6}{\sin x^3}(\cos x^3)x^2$

8. Let $u(x)$ and $v(x)$ be differentiable functions. Some of the values of u and v and their derivatives are given in the table below.

x	$u(x)$	$u'(x)$	$v(x)$	$v'(x)$
0	1	2	4	6
1	3	−1	2	3
2	4	5	7	1
3	2	5	5	−1

Let $F(x) = u(v(x))$. What is $F'(1)$?

   a. 15

   b. −3

   c. 12

   d. 3

   e. 9

9. Let $f(x) = 2x + 1$. Find $f^{-1}(x)$.

   a. 2

   b. $\dfrac{1}{2x+1}$

   c. $\dfrac{1}{2}x - \dfrac{1}{2}$

   d. $\dfrac{x+1}{2}$

   e. None of these

10. Given the implicitly defined function $y^2 - x^5 y^3 = -4$. What is the equation of the tangent line at the point $(1,2)$?

   a. $y = x - 4$

   b. $y = x + 2$

   c. $y = 5x - 4$

   d. $y = -5x + 7$

   e. $y = 3x - 7$

11. If $f(2) = 7$ and $f'(2) = 3$, then $f(2.2)$ is approximately

   a. 10

   b. -6.4

   c. 7.3

   d. 7.6

   e. -6.7

Part II. Work out problems. Partial credit will be given. Calculators are permitted after the scantrons are collected.

12. $\left[\,8 \text{ points each}\,\right]$ Compute y' if

   a. $y = e^{2x} \sin(3x)$

   b. $y = \dfrac{x + \sin x}{\cos x}$

13. $\left[\,10 \text{ points}\,\right]$ Compute $\dfrac{d}{dx}(\cos(x))$ using the secant method. You may use the two basic trig limits without proof.

14. $\left[10\text{ points}\right]$ Given that $f(x) = x^{\ln x}$. Find $f'(e)$.

15. $\left[10\text{ points}\right]$ Suppose that g is the inverse function of a differentiable function f and that $f(6) = 2$, $f'(2) = 9$ and $f'(6) = 3$. Find $g'(2)$.

16. $\left[\,10\ \text{points}\,\right]$ The setting sun casts a shadow over a building 200 ft high. At what rate does the shadow move when the it is 200 ft long? Hints: The sun moves $15°$ per hour. Convert this to radians. Express the length of the shadow in terms of $\tan\theta$.