Name ______________________________

10 digit PUID ______________________________

RECITATION Section Number and time ______________________________

Recitation Instructor ______________________________

Lecturer ______________________________

Mark Test 01 on your scantron!

Instructions:

1. Fill in all the information requested above and on your scantron sheet. On the scantron sheet also fill in the little circles for your name, section number and PUID.

2. This booklet contains 14 problems, each worth 7 points. You get 2 points for correctly filling the required information here and on the scantron. The test booklet has 9 pages, including this one.

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. No aids: books, notes, calculators, electronic devices etc. are allowed.

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

1. Let $f(x) = \dfrac{1}{2x-1}$. If we simplify the expression $\dfrac{f(3+h)-f(3)}{h}$, we obtain

A. $\dfrac{-1}{5(5+2h)}$

B. $\dfrac{1}{5(5+2h)}$

C. $\dfrac{3}{5(5+2h)}$

D. $\dfrac{-2}{5(5+2h)}$

E. $\dfrac{1}{15(5+2h)}$

2. $\lim\limits_{x\to 25} \dfrac{5-\sqrt{x}}{25x-x^2} =$

A. 5

B. 25

C. 1/25

D. 1/750

E. 1/250

3. If $g(x) = \ln(x^3)$, then $g'(x) =$

A. $\dfrac{1}{x^3}$

B. $\dfrac{\ln 3}{x^3}$

C. $\dfrac{3}{x^2}$

D. $\dfrac{3}{x}$

E. $3x^2$

4. Find an equation for the tangent line to the graph of $y = \tan x$ at $x = \pi/6$.

A. $y - \dfrac{1}{\sqrt{3}} = \dfrac{4}{3}(x - \dfrac{\pi}{6})$

B. $y - \sqrt{3} = \dfrac{4}{3}(x - \dfrac{\pi}{6})$

C. $y - \dfrac{1}{\sqrt{3}} = \dfrac{1}{8}(x - \dfrac{\pi}{6})$

D. $y - \dfrac{1}{\sqrt{3}} = 8(x - \dfrac{\pi}{6})$

E. $y - \sqrt{3} = 4(x - \dfrac{\pi}{6})$

5. The function

$$g(x) = \begin{cases} x^3 + 2x, & \text{if } x \le 5 \\ \dfrac{5x^2 - x^3}{x - 5}, & \text{if } x > 5 \end{cases}$$

is not continuous at $x = 5$ because

A. $\lim_{x \to 5} g(x)$ does not exist

B. $\lim_{x \to 5^-} g(x)$ does not exist

C. $\lim_{x \to 5^+} g(x)$ does not exist

D. g is not defined at 5

E. All of the above

6. $\lim_{t \to 0} t^2 e^{\cos(1/t)} =$

A. 3

B. 0

C. -1

D. Does not exist

E. None of the above

7. Suppose $\sin(xy^2) = y$. Find dy/dx when $(x, y) = (\pi/2, 1)$.

A. $5/\pi$

B. $\dfrac{\sqrt{2}}{4 - 2\pi}$

C. $\dfrac{\pi + 2}{6\sqrt{2}}$

D. $7/\pi$

E. 0

8. If $y = (8\cos 3x)(\sin 2x)$, $y'(\pi/2) =$

A. 16

B. 14

C. 0

D. -2

E. 1

9. If $h(x) = (\cos 2x)^3$, then $h'(\pi/6) =$

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

B. $3\sqrt{3}$

C. $-3\sqrt{3}$

D. 3

E. $\dfrac{3\sqrt{3}}{2}$

10. $\lim\limits_{u \to 0} \dfrac{\tan 3u}{u} =$

A. 1

B. 3

C. 9

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

E. $\dfrac{1}{6}$

11. If $F(x) = \dfrac{(x^3+x)\sqrt{x^2+5}}{x^2+x+1}$, then logarithmic differentiation gives that $F'(x) =$

A. $F(x)(\dfrac{x}{x^2+5} + \dfrac{3x^2+1}{x^3+x} - \dfrac{2x+1}{x^2+x+1})$

B. $\dfrac{x}{x^2+5} + \dfrac{x^2+1}{x^3+x} - \dfrac{2x+1}{x^2+x+1}$

C. $(3x^2+1)\ \dfrac{x}{x^2+5} - (x^2+x+1)$

D. $\dfrac{1}{x^2+5} + \dfrac{1}{x^3+x} - \dfrac{1}{x^2+x+1}$

E. $F(x)\ (\dfrac{1}{x^2+5} + \dfrac{1}{x^3+x} - \dfrac{1}{x^2+x+1})$

12. If $T(x) = 2\sqrt{x} - \dfrac{1}{2\sqrt{x}}$, then $T'(x) =$

A. $x + \dfrac{1}{x\sqrt{x}}$

B. $\dfrac{1}{\sqrt{x}} + \dfrac{1}{x\sqrt{x}}$

C. $\dfrac{1}{\sqrt{x}} + \dfrac{1}{4x\sqrt{x}}$

D. $\dfrac{4x-1}{4x\sqrt{x}}$

E. $\dfrac{4}{\sqrt{x}} + \dfrac{1}{x\sqrt{x}}$

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

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

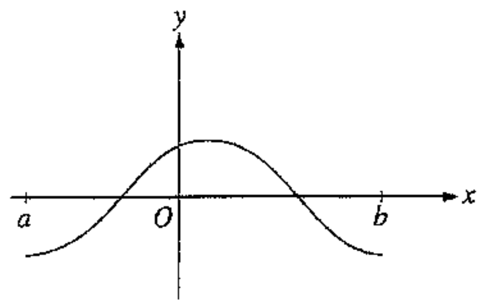
B. $3\pi e^{-3\pi} - e^{-3\pi}$

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

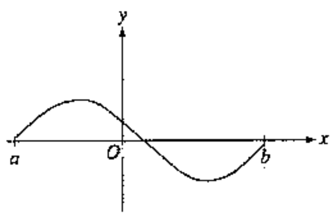
D. $3\pi e^{-3\pi} - 1$

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

14. The graph of $f(x)$ is shown. Which could be the graph of the derivative of f?



A



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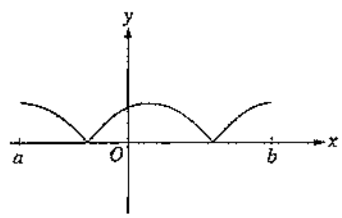

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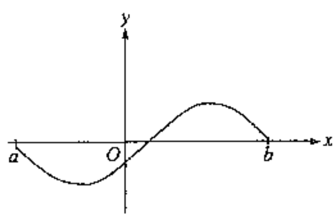

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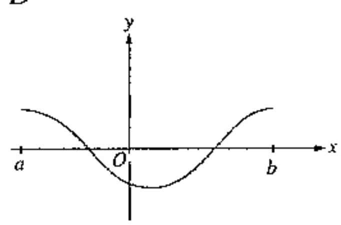

E