MA 161 & 161E Midterm Exam 2, October 2003

Name ______________________________

Student ID number ______________________________

Lecturer ______________________________

Recitation instructor ______________________________

INSTRUCTIONS:

1. Fill in all the information requested above and on the scantron sheet.
2. This booklet contains 12 problems, each worth 8 points. You get 2 points for coming and 2 if you fully comply with instruction 1. The maximum score is 100 points.
3. For each problem circle the answer of your choice, and also mark it on the scantron sheet.
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.

Formulas (which you may or may not use)

$$\cos 2x = \cos^2 x - \sin^2 x, \qquad \sin 2x = 2\sin x \cos x,$$

$$\cosh x = \frac{e^x + e^{-x}}{2}, \qquad \sinh x = \frac{e^x - e^{-x}}{2}.$$

DACE BEEA BAED

1. $\frac{d}{du}\left(\frac{\sqrt[3]{u}}{\sqrt{u}}\right) =$

A. $3\sqrt{u}$

B. $-\frac{1}{3\sqrt[6]{u^7}}$

C. $\frac{3}{2\sqrt[6]{u}}$

D. $-\frac{1}{6\sqrt[6]{u^7}}$

E. $\frac{2}{3\sqrt[6]{u}}$

2. If the line tangent to the curve $y = x^2 + 3x + 1$ at (a, b) passes through the point $(1, 4)$, then the possible values of a are

A. 0 and 2

B. $\frac{1}{4}$ and 2

C. $\frac{3}{4}$ and 1

D. 0 and 1

E. $\frac{1}{4}$ and $\frac{3}{4}$

3. If $h(x) = f(x)\,g(x)$, $f(0) = 1$, $f'(0) = 3$, $g(0) = 1$, and $h'(0) = 5$, then $g'(0) =$

A. 0

B. 1

C. 2

D. -1

E. -2

4. The electric resistance of a wire is $R = \dfrac{\rho\, l}{A}$, where ρ is the specific resistance of the material of the wire, l is the length of the wire and A the area of a cross-section. If specific resistance and cross-sectional area are fixed, the rate of change of R with respect to length is

A. $\dfrac{l}{A}$

B. $\rho\, l$

C. $-\dfrac{\rho\, l}{A^2}$

D. $-\dfrac{2\rho\, l}{A^2}$

E. $\dfrac{\rho}{A}$

5. $\lim_{x \to 0} \frac{\sin 2x}{\tan 3x}$

A. $= 1$

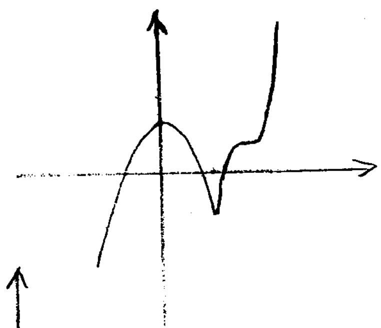
B. $= \frac{2}{3}$

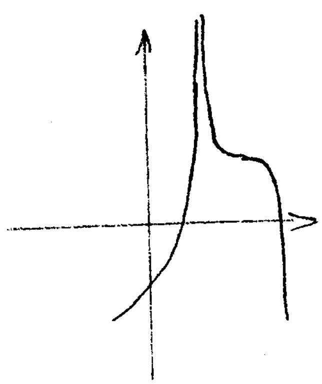
C. $= \frac{1}{3}$

D. $= \frac{1}{6}$

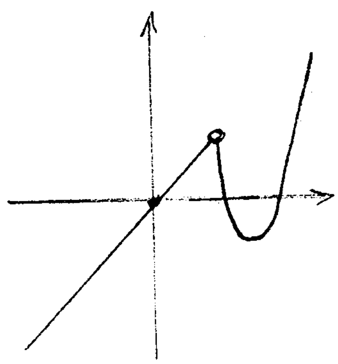
E. does not exist

6. If the graph of f is sketched on the right, which is the graph of f'?





A.



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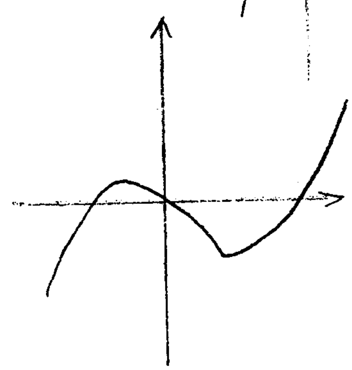

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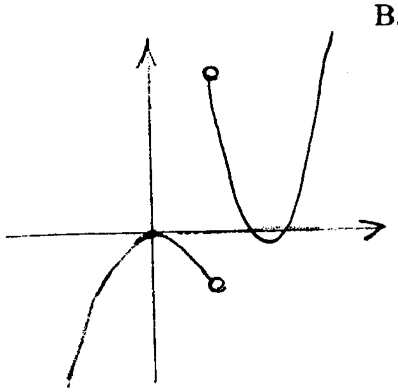
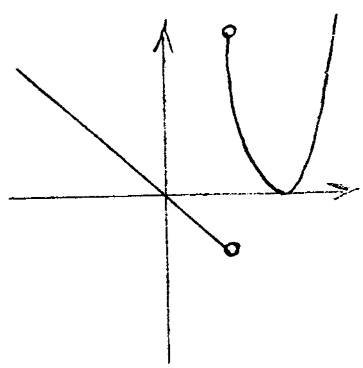


D.



E.

7. If $y = \sqrt[3]{\dfrac{t^3+1}{t^3-1}}$, then $\dfrac{dy}{dt} =$

A. $\dfrac{2t^5}{\sqrt[3]{(t^3-1)^4(t^3+1)^2}}$

B. $-\dfrac{2t^2}{\sqrt[3]{(t^3-1)^2(t^3+1)^4}}$

C. $\dfrac{6t^2}{\sqrt[3]{(t^3-1)^4(t^3+1)^2}}$

D. $-\dfrac{6t^2\,(t^3+1)}{\sqrt[3]{(t^3-1)^2}}$

E. $-\dfrac{2t^2}{\sqrt[3]{(t^3-1)^4(t^3+1)^2}}$

8. An equation of the line tangent to the graph of $x\cos y + y\cos x = 1$ at the point $(0,1)$ is

A. $(\cos 1)\,x + y = 1$

B. $x + y = 1$

C. $-(\sin 1)\,x + y = 1$

D. $x - y = 1$

E. $(\tan 1)\,x + y = 1$

9. Evaluate $\lim\limits_{s\to\frac{\pi}{3}} \dfrac{\tan s - \sqrt{3}}{s - \frac{\pi}{3}}$.

A. 2

B. 4

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

D. $\dfrac{1}{4}$

E. $\sqrt{3}$

10. If $f(x) = \cosh 2x$, then $f''(x) =$

A. $4\cosh 2x$

B. $-2\cosh 2x$

C. $-4\sinh 2x$

D. $2\sinh 2x$

E. $2\sinh 4x$

11. If $f(x) = \sqrt{x}\, e^{x^2}\,(x^2-7)^9$, then $f'(x) =$

A. $\sqrt{x}\, e^{x^2}\,(x^2-7)^9 \left[-\frac{1}{2x} + 2x + \frac{2x}{9(x^2-7)}\right]$

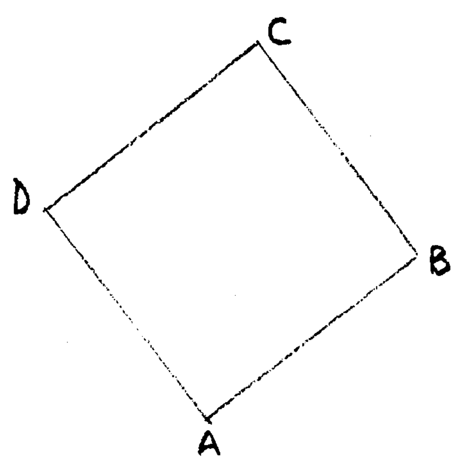
B. $\sqrt{x}\, e^{x^2}\,(x^2-7)^9 \left[\frac{1}{2x} + 2x + \frac{2x}{9(x^2-7)^8}\right]$

C. $\sqrt{x}\, e^{x^2}\,(x^2-7)^9 \left[\frac{1}{2x} + 1 + \frac{18x}{x^2-7}\right]$

D. $\sqrt{x}\, e^{x^2}\,(x^2-7)^9 \left[-\frac{1}{2x} + 2x + \frac{18x}{(x^2-7)^8}\right]$

E. $\sqrt{x}\, e^{x^2}\,(x^2-7)^9 \left[\frac{1}{2x} + 2x + \frac{18x}{x^2-7}\right]$

12. A mini-baseball diamond is a square ABCD with side 9 meters. A batter hits the ball at A and runs toward first base B with a speed of 2 m/s. At what rate is his distance from third base D increasing when he is two-thirds of the way to first base?



A. $\frac{3}{\sqrt{13}}$ m/s

B. 2 m/s

C. 4 m/s

D. $\frac{4}{\sqrt{13}}$ m/s

E. $\frac{24}{\sqrt{13}}$ m/s