

MTH 154–CALCULUS EXAM ONE (CL1): SAMPLE EXAM

PROBLEM 1. Compute, if possible,

$$\lim_{x \rightarrow 1} \frac{(x^2 - 2x - 3)}{(x^2 + 2x + 1)}$$

The result is closest to:

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|----------|----------|----------|-------------------|----------|
| A. -0.80 | B. -0.75 | C. -1.00 | D. Does Not Exist | E. -0.65 |
| F. -0.90 | G. -0.70 | H. -0.95 | I. -0.85 | J. -0.55 |
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PROBLEM 2. Find the average rate of change for $f(x) = x^2 + x$ as x changes from 0 to 3. It is closest to

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|------|------|------|------|------|
| A. 2 | B. 1 | C. 5 | D. 6 | E. 9 |
| F. 0 | G. 3 | H. 8 | I. 7 | J. 4 |
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PROBLEM 3. Let $y = f(x) = 2x^3 - 3x^2 + 2$. Find the slope intercept form of the equation of the tangent line to $y = f(x)$ at the point where $x = 1$. The y intercept of this line is closest to

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|-------|------|------|-------|------|
| A. 9 | B. 4 | C. 2 | D. 11 | E. 8 |
| F. 10 | G. 6 | H. 1 | I. 3 | J. 7 |
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PROBLEM 4. Find the x -coordinates where horizontal tangents for $f(x) = 2x^3 + 18x^2 + 30x - 16$ occur. The rightmost one occurs closest to

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|-------|------|-------|-------|-------|
| A. 2 | B. 1 | C. 4 | D. -1 | E. -2 |
| F. -5 | G. 0 | H. -4 | I. -3 | J. -6 |
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PROBLEM 5. Let $f(x) = 5x^2 + 2x - 1$ and $g(x) = 2x^2 - 7$. Which of the following is the derivative of $\frac{f(x)}{g(x)}$?

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|-------------------------------------|--|--|--|
| A. $\frac{-4x^2 - 66x - 14}{16x^2}$ | B. $\frac{40x^3 + 12x^2 - 74x - 14}{(2x^2 - 7)^2}$ | C. $\frac{5x + 2}{2x}$ | D. $\frac{-4x^2 - 66x - 14}{(2x^2 - 7)^2}$ |
| E. $\frac{10x + 2}{4x}$ | F. $\frac{40x^3 + 12x^2 - 74x - 14}{16x^2}$ | G. $\frac{12x^2 - 74x - 14}{(2x^2 - 7)^2}$ | H. $\frac{12x^2 - 74x - 14}{16x^2}$ |
| I. $-\frac{5x + 1}{2x}$ | J. Not listed here. | | |
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PROBLEM 6. Let $R(u) = 8\sqrt{u} - 5u^{\frac{2}{3}}$. Which of the following is the derivative of $R(u)$?

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|--|---|---|--|
| A. $\frac{8}{\sqrt{u}} + \frac{5}{u^{\frac{1}{3}}}$ | B. $\frac{4}{\sqrt{u}} - 103u^{-\frac{2}{3}}$ | C. $\frac{8}{\sqrt{u}} - \frac{10}{3u^{\frac{1}{3}}}$ | D. $\frac{-4}{\sqrt{u}} - \frac{10}{3u^{\frac{1}{3}}}$ |
| E. $\frac{8}{\sqrt{u}} + 5u^{-\frac{2}{3}}$ | F. $\frac{4}{\sqrt{u}} - \frac{10}{3u^{\frac{1}{3}}}$ | G. $\frac{8}{\sqrt{u}} - 5u^{-\frac{2}{3}}$ | H. $8\sqrt{u} - 5u^{\frac{2}{3}}$ |
| I. $\frac{-4}{\sqrt{u}} + \frac{10}{3u^{\frac{1}{3}}}$ | J. Not listed here. | | |

EXAM CONTINUES ON BACK OF SHEET

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PROBLEM 7. Suppose taxes are determined by n (the number of units made) by the formula $T = -100 + 160n - 2n^2$. When $n = 10$ the rate of change of taxes is closest to

- A. 100 B. 110 C. 140 D. 115 E. 120
 F. 130 G. 90 H. 135 I. 125 J. 95

PROBLEM 8. A cost function is given by $C(q) = 70q - 0.08q^2 + 590$, where q is the number of items made. When $q = 100$ the marginal cost is closest to

- A. 54 B. 46 C. 86 D. 50 E. 62
 F. 82 G. 70 H. 78 I. 74 J. 58

PROBLEM 9. Let $f(x) = 5x^2 + 7x - 8$ and $g(x) = 3x^3 - 2x^2 + 4$. Which of the following is the derivative of $f(x)g(x)$?

- A. $(10x + 7)(9x^2 - 4x) + (5x^2 + 7x - 8)(3x^3 - 2x^2 + 4)$
 B. $(10x + 7)(3x^3 - 2x^2 + 4)$
 C. $(10x + 7)(9x^2 - 4x)$
 D. $(10x + 7)(3x^3 - 2x^2 + 4)(5x^2 + 7x - 8)(9x^2 - 4x)$
 E. $(10x + 7)(3x^3 - 2x^2 + 4) - (5x^2 + 7x - 8)(9x^2 - 4x)$
 F. $(10x + 7) + (9x^2 - 4x)$
 G. $(5x^2 + 7x - 8)(9x^2 - 4x)$
 H. $(10x + 7)(5x^2 + 7x - 8) - (9x^2 - 4x)(3x^3 - 2x^2 + 4)$
 I. $(10x + 7)(3x^3 - 2x^2 + 4) + (5x^2 + 7x - 8)(9x^2 - 4x)$
 J. Not listed here.

PROBLEM 10. Let $R(u) = \frac{3u^3 - u + 6}{u}$. Which of the following is the derivative of $R(u)$?

- A. $9u^2 + 1$ B. $9u^2 - 1$ C. $6u + \frac{u^2}{6}$ D. $6u - \frac{1}{u^2}$
 E. $6u + \frac{6}{u}$ F. $6u^2 - 6u$ G. $6u + 6u^2$ H. $6u - 6u^2$
 I. $6u + \frac{1}{u^2}$ J. Not listed here.

PROBLEM 11. Solve the inequality

$$2 \leq 10 - 2x \leq 12$$

Which of the following is the solution?

- A. $-4 \leq x \leq 15$ B. $0 \leq x \leq 1$ C. $10 \leq x \leq 25$ D. $-1 \leq x \leq 1$ E. $-2 \leq x \leq 7$
 F. $3 \leq x \leq \frac{7}{2}$ G. $-7 \leq x \leq 1$ H. $-1 \leq x \leq 4$ I. $-3 \leq x \leq 9$ J. Not listed here.

PROBLEM 12. Solve the equation

$$3x^2 - 6x = -3$$

The smaller solution, if any, is closest to

- A. 10 B. 7 C. 8 D. 1 E. 3
 F. 5 G. 4 H. 6 I. 2 J. 9

The correct answers are: 1-C, 2-J, 3-H, 4-D, 5-D, 6-F, 7-E, 8-A, 9-I, 10-J, 11-H, 12-D