

MTH 155 CALCULUS EXAM THREE (CL3): SAMPLE EXAM

**PROBLEM 1.** Let  $f(x) = 4\sqrt{5x-2}$ . Which of the following is an antiderivative of  $f(x)$ ?

- A.  $-4x\sqrt{5x-2}$       B.  $\frac{8}{3}x\sqrt{5x-2}$       C.  $\frac{8}{15}(5x-2)^{\frac{3}{2}}$       D.  $\frac{8}{3}(5x-2)^{\frac{3}{2}}$   
 E.  $\frac{8}{3}x(5x-2)^{\frac{3}{2}}$       F.  $4x\sqrt{5x-2}$       G.  $4x\sqrt{\frac{5}{2}x^2-2x}$       H.  $4x + \frac{2}{3}(5x-2)^{\frac{3}{2}}$   
 I.  $\frac{20}{3}(5x-2)^{\frac{3}{2}}$       J. Not listed here.
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**PROBLEM 2.** Compute, if possible,

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

The result is closest to:

- A. 3.8      B. 3.6      C. 3.0      D. 4.0      E. Does Not Exist  
 F. 2.4      G. 2.8      H. 3.2      I. 2.6      J. 2.2
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**PROBLEM 3.** Find the area between the graph of  $g(x) = -2x^2 + 10x - 8$ , the x-axis, and  $x = 1$  and  $x = 5$ . WARNING! The graph of  $g(x)$  may cross the x-axis between the given x values. The area is closest to

- A. 12.5      B. 15.5      C. 11      D. 12      E. 14  
 F. 15      G. 11.5      H. 10.5      I. 13.5      J. 14.5
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**PROBLEM 4.** Approximate the area under the curve  $f(x) = e^{-x} + 1$  and above the x-axis between  $x = -4$  and  $x = 0$  using 4 rectangles. Let the height of each rectangle be given by the value of the function at the left side of the rectangle. The approximation is closest to

- A. 105      B. 85      C. 120      D. 75      E. 80  
 F. 115      G. 90      H. 100      I. 95      J. 110
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**PROBLEM 5.** The annual maintenance cost for a machine which has been in service for  $n$  years is  $50 + 8n$ . The machine has already been used for 10 years. The total maintenance costs for the machine over the next 10 years is closest to

- A. \$1900      B. \$1800      C. \$1300      D. \$2000      E. \$1600  
 F. \$2200      G. \$1500      H. \$1700      I. \$2300      J. \$1400
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**PROBLEM 6.** Let  $f(x) = 2x + \frac{3}{x}$ . Which of the following is an antiderivative of  $f(x)$ ?

- A.  $x^2 + \ln(|x|)$       B.  $x^2 - 3\ln(|x|)$       C.  $x^2 - \frac{3}{x^2}$       D.  $x^2 - \frac{3}{x^2}$       E.  $2x^2 + 3\ln(|x|)$   
 F.  $2 + 3\ln(|x|)$       G.  $x^2 + \frac{3}{x^2}$       H.  $x^2 + 3\ln(|x|)$       I.  $2 - \frac{3}{x^2}$       J. Not listed here.

EXAM CONTINUES ON BACK OF SHEET

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**PROBLEM 7.** Which of the following is the derivative of  $8x^{\frac{3}{2}} - 12x^{-\frac{1}{2}}$

- A.  $\frac{16}{5}x^{\frac{5}{2}} - 24x^{\frac{1}{2}}$     B.  $12x^{\frac{1}{2}} - 6x^{-\frac{1}{2}}$     C.  $8x^{\frac{5}{2}} - 12x^{\frac{1}{2}}$     D.  $-\frac{3}{35}x^{\frac{1}{2}} - 12x^{-\frac{3}{2}}$     E.  $\frac{16}{3}x^{\frac{1}{2}} + 24x^{-\frac{3}{2}}$   
 F.  $12x^{\frac{1}{2}} + 6x^{-\frac{3}{2}}$     G.  $12x^{\frac{3}{2}} + 6x^{-\frac{1}{2}}$     H.  $8x^{\frac{1}{2}} - 12x^{-\frac{3}{2}}$     I.  $\frac{16}{5}x^{\frac{5}{2}} + 24x^{\frac{1}{2}}$     J. Not listed here.
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**PROBLEM 8.** Suppose profit is determined by  $n$  (the number of units made) by the formula  $P = 100n - n^2$ . When  $n = 60$  the rate of change of profit is closest to

- A. -5                      B. -30                      C. -35                      D. -25                      E. -55  
 F. -10                      G. -50                      H. -40                      I. -45                      J. -20
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**PROBLEM 9.** Solve the following system.

$$8x - 7y = 60$$

$$x + 8y = 43$$

Then  $x$  is closest to

- A. 16                      B. 15                      C. 6                      D. 14                      E. 7  
 F. 11                      G. 10                      H. 13                      I. 9                      J. 12

**PROBLEM 10.** And  $y$  is closest to

- A. 4                      B. -1                      C. 3                      D. 5                      E. 7  
 F. 8                      G. 2                      H. -2                      I. 0                      J. 1
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**PROBLEM 11.** The function  $4x + \frac{3}{x}$  is an antiderivative of  $g(x)$ . Then  $g(1)$  is closest to

- A. 8                      B. 5                      C. 7                      D. 6                      E. 1  
 F. 11                      G. 10                      H. 4                      I. 9                      J. 2
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**PROBLEM 12.** Simplify  $\frac{f(x+h)-f(x)}{h}$  given  $f(x) = x^2 - x$

- A.  $-2x + h - 1$     B.  $2x - 1$     C.  $2x + h$     D.  $-2x - h - 1$     E.  $2x + h - 1$   
 F.  $2x - h - 1$     G.  $2x - h$     H.  $-2x - h$     I.  $2x - h + 1$     J. Not listed here.

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