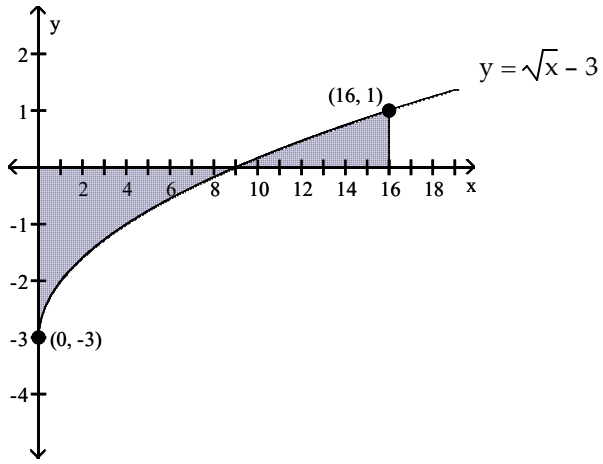
MAC 2233
Business Calculus –– Waner
Chapter 7
Fall 2019

Name_____
Date _____
Day/Time: _____

To receive credit for correct answers, supporting work MUST be provided. Answers without supporting work will receive no credit. This exam is worth 100 points. Each problem is worth 5 points.

Find the area of the shaded region.

1) 1) _____



Provide an appropriate response.

2) Find the area bounded by the parabolas $y = 6x - x^2$ and $y = x^2 - 2x$. (Round answer to three decimal places.) 2) _____

A) – 21.333 B) 21.333 C) 22 D) 21.667

BONUS QUESTION: up to 5 points

Evaluate the improper integral. If the integral does not converge, state that the integral is divergent.

3) $\int_0^{\infty} \frac{3}{(x+1)^2}\,dx$ 3) _____

Find the average value of the function on the given interval.

4) $f(x) = x^2 e^{5x}$; [0, 4] Give your answer in exact form. 4) _____

A) $\frac{5}{2}e^{20} - \frac{1}{2}$ B) $\frac{181}{250}e^{20} - \frac{1}{250}$ C) $\frac{362}{125}e^{20} - \frac{2}{125}$ D) $\frac{181}{250}e^{20}$

Solve the problem.

5) The price per share of a stock can be approximated by the function $S(t) = t(24 - 3t) + 25$, where t is time (in years) since the stock was purchased. Find the average price of the stock over the first 8 years. 5) _____

A) $456.00 B) $76.20 C) $57.00 D) $35.50

The function represents the rate of flow of money in dollars per year. Assume a 10–year period and find the present value.

6) $f(x) = 2000x - 130x^2$ at 5% compounded continuously 6) _____

A) $102,089.58 B) $1,303,820.61 C) $42,236.84 D) $2,602,236.84

7) $f(x) = 1000e^{-0.04x}$ at 8% compounded continuously 7) _____

A) $27,667.64 B) $19,334.31 C) $5823.38 D) $10,843.29

The function represents the rate of flow of money in dollars per year. Assume a 10–year period and find the accumulated amount of money flow at t = 10.

8) $f(x) = 0.03x + 800$ at 5% compounded continuously 8) _____

A) $42,417.32 B) $9437.57 C) $8651.10 D) $10,381.32

Solve the problem.

9) The rate of a continuous money flow starts at $500 and increases exponentially at 4% per year for 10 years. Find the final amount if interest is earned at 8% compounded continuously. 9) _____

A) $41,501.46 B) $46,467.07 C) $13,682.20 D) $9171.45

10) A money market fund has a continuous flow of money at a rate of $f(x) = 1900x - 190x^2$ for 10 years. Find the final amount if interest is earned at 2% compounded continuously. 10) _____

A) $28,681.85 B) $23,482.71 C) $31,666.67 D) $35,032.09

Find the consumer's surplus for the following demand function at the given point.

11) Find the consumers' surplus at a price level of $\overline{p}$ = \$7 for the price–demand equation $p = D(x) = 25 - 0.4x$. 11) _____

A) \$405 B) \$720 C) \$29,250 D) \$4050

Find the producer's surplus for the following supply function at the given point.

12) Find the producers' surplus at a price level of $\overline{p}$ = \$30 for the price–supply equation $p = S(x) = 14 + 0.0004x^2$. 12) _____

Solve the problem.

13) Find the equilibrium quantity if the price–demand equation is $p = D(x) = 23 - \frac{1}{20}x$, and the price–supply equation is $p = S(x) = 8 + \frac{1}{8{,}000}x^2$. 13) _____

A) 200 B) 13 C) –600, 200 D) –600

14) Find the consumers' surplus and producers' surplus for $p = D(x) = 71 - \frac{1}{10}x$ and $p = S(x) = 35 + \frac{1}{20}x$. 14) _____

A) CS = \$14,160
PS = \$1440

B) CS = \$15,160
PS = \$1440

C) CS = \$2880
PS = \$1440

D) CS = \$2880
PS = \$1660

Evaluate using integration by parts.

15) $\int x^4 \ln 8x \, dx$ 15) _____

A) $\frac{1}{5} x^5 \ln 8x - \frac{1}{25} x^5 + C$

B) $\frac{1}{5} x^5 \ln 8x + \frac{1}{25} x^5 + C$

C) $\frac{1}{5} x^5 \ln 8x - \frac{1}{30} x^6 + C$

D) $\ln 8x - \frac{1}{5} x^5 + C$

16) $\int x^2 e^{2x} dx$ 16) _____

A) $\frac{x^2}{2} e^{2x} - xe^{2x} + C$

B) $\frac{x^2}{2} e^{2x} - 2xe^{2x} + 1 + C$

C) $\frac{x^2}{2} e^{2x} - 2xe^{2x} + C$

D) $\frac{x^2}{2} e^{2x} - \frac{x}{2} e^{2x} + \frac{1}{4} e^{2x} + C$

Evaluate using the substitution method.

17) $\int \frac{7x^6 dx}{(4 + x^7)^4}$ 17) _____

18) $\int \frac{13e^{5x} dx}{e^{5x} + 1}$ 18) _____

19) $\int x^4 \sqrt{x^5 + 9}\, dx$ 19) _____

Evaluate. You MUST show all your work, processed without the use of a calculator.

20) $\int_{1}^{6} \frac{2x + 5}{x^2 + 5x + 1} dx$ 20) _____

21) $\int_{0}^{1} 5x^4 e^{x^5} \, dx$ 21) _____