

BARUCH COLLEGE
MATH 2001, DAY, FORM A, PART 1

NAME: _____

SIGNATURE: _____

INSTRUCTOR/SECTION: _____

PART 1: You are NOT ALLOWED TO USE A CALCULATOR on this part of the exam.**DIRECTIONS:** Write your name and instructor/section number on the line above and sign your name.

All exams are hand-graded by the instructor as well as machine graded, and the scores are compared. Students **MUST SHOW ALL WORK** in the area provided next to each problem. Students who do **NOT** provide supporting work **WILL NOT** receive credit for the problem.

Problems 1 – 18 are multiple choice. **CIRCLE** your answer (A, B, C, D, or E) and **MARK** your answer on the Scantron sheet.

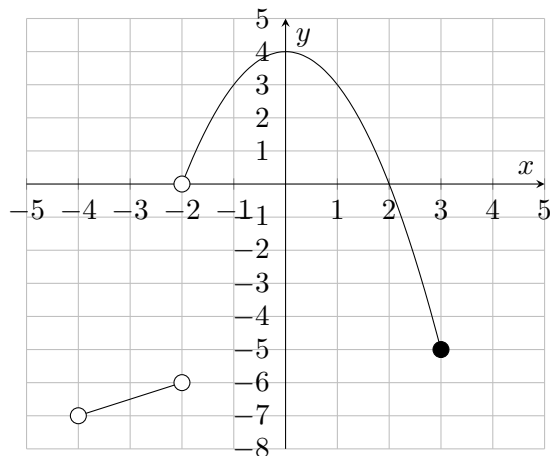
Problems 19 – 24 are free response problems. **WRITE** your answer in the blank space to the right of the problem statement.

You will have 90 minutes to complete Part 1. When you are finished with Part 1, also enter your answers on the Scantron sheet. After 90 minutes, the proctor will take this part of the exam from you and give you Part 2, which consists of 10 additional problems. You will keep the Scantron sheet.

NO ANSWERS MAY BE CHANGED ON THE SCANTRON FOR PART 1 ONCE THIS EXAM HAS BEEN COLLECTED.

1. The graph of $y = f(x)$ is sketched below.

1. _____



Identify the domain and range of $f(x)$.

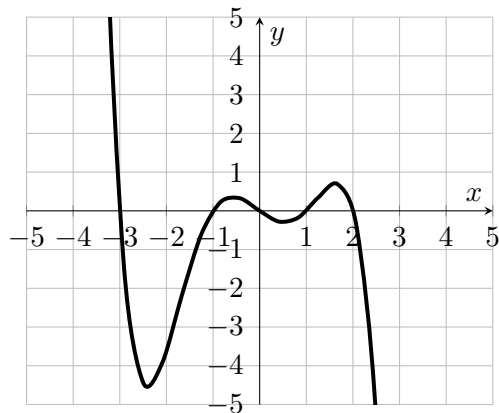
- (A) Domain: $(-4, 3]$, Range: $(-7, -6) \cup [-5, 4]$
- (B) Domain: $(-4, -2) \cup (-2, 3]$, Range: $(-7, -6) \cup [-5, 4]$
- (C) Domain: $[-4, -2) \cup (-2, 3)$, Range: $[-7, -6] \cup (-5, 4)$
- (D) Domain: $(-4, 3]$, Range: $[-7, 4]$
- (E) Domain: $(-4, -2) \cup (-2, 3]$, Range: $(-7, 4]$

2. Find an equation of the line **parallel** to $2x + 5y = 7$ passing through the point $(3, -4)$.

2. _____

- (A) $y = \frac{-2}{5}x + \frac{7}{5}$
- (B) $y = \frac{-2}{5}x - \frac{14}{5}$
- (C) $y = \frac{5}{2}x + 13$
- (D) $y = \frac{5}{2}x - \frac{23}{2}$
- (E) $y = \frac{2}{5}x - \frac{26}{5}$

3. Suppose $f(x)$ is a polynomial. A complete graph of $y = f(x)$ is sketched below: 3._____



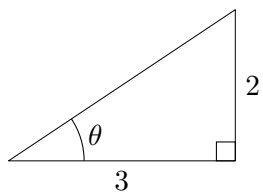
Which of the following statements COULD be true?

- (A) The degree of the polynomial is 7 and the leading coefficient is positive
 - (B) The degree of the polynomial is 4 and the leading coefficient is positive
 - (C) The degree of the polynomial is 3 and the leading coefficient is negative
 - (D) The degree of the polynomial is 6 and the leading coefficient is negative
 - (E) The degree of the polynomial is 5 and the leading coefficient is negative
4. Let $f(x) = 3x^2 + 1$. Evaluate the difference quotient $\frac{f(x+h) - f(x)}{h}$ for $h \neq 0$. Simplify your answer as much as possible. 4._____

- (A) $6x$ (B) $6x + 1$ (C) $6x + 3h$
- (D) $3h$ (E) $6x + 3h + 2$

5. Given the right triangle below:

5. _____



Evaluate $\sec \theta$.

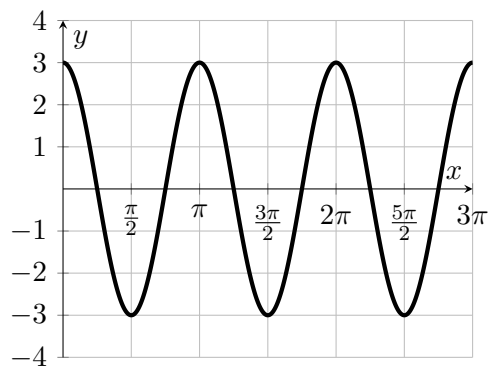
- (A) $\frac{2}{3}$ (B) $\frac{3}{2}$ (C) $\frac{\sqrt{13}}{2}$ (D) $\frac{1}{2}$ (E) $\frac{\sqrt{13}}{3}$

6. Determine the domain of $f(x) = \frac{x}{3x^7 - 12x^5}$. Write your answer in interval notation.

6. _____

- (A) $(-\infty, -2) \cup (-2, 0) \cup (0, 2) \cup (2, \infty)$
(B) $(-\infty, 0) \cup (0, \infty)$
(C) $(-\infty, 0) \cup (0, 2) \cup (2, \infty)$
(D) $(0, 2) \cup (2, \infty)$
(E) $(2, \infty)$

7. The graph of a function of the form $f(x) = A \cos(Bx)$ is depicted below. 7. _____



Determine A and B .

- (A) $A = 3, B = 2$ (B) $A = 3, B = \frac{1}{2}$ (C) $A = \frac{1}{3}, B = 2$
 (D) $A = \frac{1}{2}, B = \frac{1}{3}$ (E) $A = \frac{1}{2}, B = 3$

8. Find ALL asymptote(s) to the graph of $y = \frac{3x - 3}{x^2 - 8x + 16}$ 8. _____

- (A) $y = 3, x = 4$ (B) $y = 0, x = 1, x = 4$ (C) $y = 3, x = 1$
 (D) $y = 0, x = -4, x = 4$ (E) $y = 0, x = 4$

9. Suppose $\ln a = 0.1$ and $\ln b = 0.3$. Evaluate $\ln \left(\frac{a^2}{b} \right)$. 9._____

HINT: Use properties of logarithms.

- (A) -0.2 (B) -0.1 (C) 0.1 (D) 0.2 (E) 0.5

10. Which of the following is an ODD function? 10._____

(A) $f(x) = \frac{1}{x^6}$ (B) $f(x) = 2 \sin x + 6x$ (C) $f(x) = \cos x - 3x$

(D) $f(x) = e^x - x^4$ (E) $f(x) = 3x^2 + 7$

11. Let $f(x) = \frac{7-3x}{x+5}$. Find the inverse function, $f^{-1}(x)$. 11._____

(A) $f^{-1}(x) = \frac{3x-7}{x-5}$ (B) $f^{-1}(x) = \frac{x-5}{7+3x}$ (C) $f^{-1}(x) = \frac{x-7}{5x-3}$

(D) $f^{-1}(x) = \frac{7-5x}{x+3}$ (E) $f^{-1}(x) = \frac{7+5x}{x-3}$

12. Assuming $0 < x < \frac{\pi}{2}$, which of the following is equivalent to $\frac{\cos x}{3 \cot x}$? 12._____

(A) $3 \csc x$ (B) $\frac{\csc x}{3}$ (C) $3 \sin x$

(D) $\frac{\sin x}{3}$ (E) $\frac{\sec x}{3}$

13. Solve for x :

13. _____

$$e^{2x} - 3e^x - 10 = 0.$$

- (A) $x = \ln 2$ only (B) $x = \ln 3$ only (C) $x = \ln 5$ only
(D) $x = \ln 2$ and $x = \ln 5$ (E) $x = \ln 3$ and $x = \ln 5$

14. Find all x that satisfy

14. _____

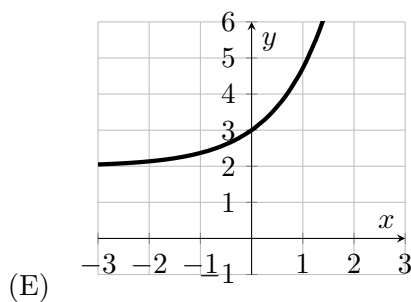
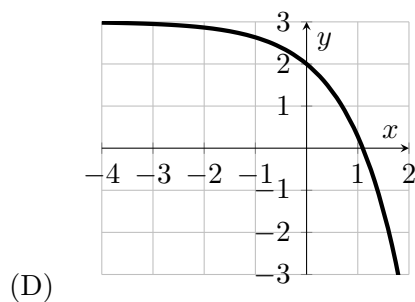
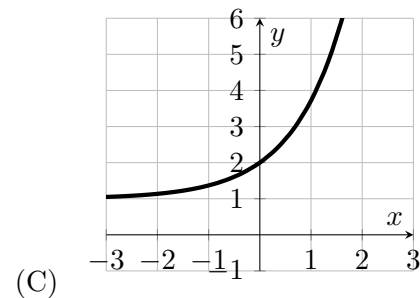
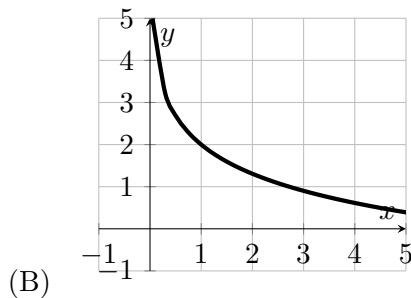
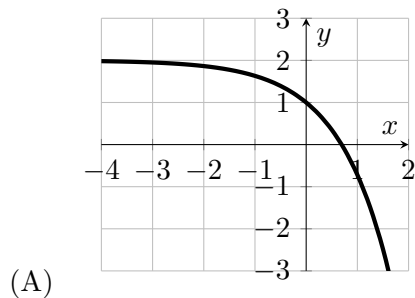
$$2 \cos^2 x + \cos x = 0$$

where $0 < x < 2\pi$.

- (A) $x = \frac{\pi}{2}, \frac{2\pi}{3}, \frac{3\pi}{2}, \frac{4\pi}{3}$
(B) $x = 0, \pi, \frac{4\pi}{3}, \frac{5\pi}{3}$
(C) $x = \frac{\pi}{3}, \frac{\pi}{2}, \frac{2\pi}{3}, \frac{3\pi}{2}$
(D) $x = 0, \frac{\pi}{3}, \frac{2\pi}{3}, \pi$
(E) $x = 0, \frac{2\pi}{3}, \frac{3\pi}{2}, \frac{5\pi}{3}$

15. Which of the following is the graph of $y = 2 - e^x$?

15. _____



16. Solve the inequality

16. _____

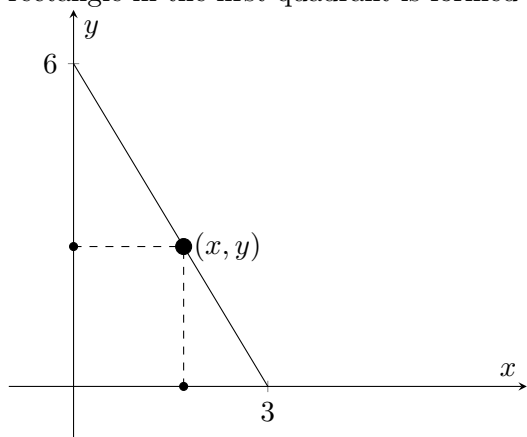
$$x^3 + x^2 \geq 2x.$$

Write your answer in interval notation.

- (A) $(0, 1)$ (B) $(-\infty, -2] \cup [0, 1]$ (C) $(-\infty, -2)$
 (D) $(-\infty, -2] \cup [1, \infty)$ (E) $[-2, 0] \cup [1, \infty)$

17. Evaluate $\arccos\left(\frac{-\sqrt{3}}{2}\right)$ using the standard domain of the arccos function. 17._____
- (A) $\frac{\pi}{6}$ (B) $\frac{\pi}{3}$ (C) $\frac{2\pi}{3}$ (D) $\frac{5\pi}{6}$ (E) $\frac{4\pi}{3}$

18. A point (x, y) in the first quadrant on the line $y = 6 - 2x$ is chosen, and a rectangle in the first quadrant is formed as shown below: 18._____



Find a function $P(x)$ that gives the perimeter of this rectangle as a function of the x -coordinate of the chosen point (for $0 < x < 3$).

- (A) $P(x) = 6 - x$ (B) $P(x) = 12 - 2x$ (C) $P(x) = 6x - 2$
(D) $P(x) = 12 + 2x$ (E) $P(x) = 12x - 6$

19. Suppose $\cos \theta = \frac{2}{3}$ for an angle θ lying in Quadrant IV. Find $\tan \theta$.

19. _____

20. Solve for x :

$$3^{4x-1} = \left(\frac{1}{9}\right)^{3x+2}.$$

20. _____

Write your answer as an integer or fraction in lowest terms.

21. Solve for x :

$$2 \log_7(x) + 5 = 9.$$

21. _____

Write your answer as an integer or fraction in lowest terms.

22. Suppose, for some constants b and c , the polynomial

$$f(x) = x^2 + bx + c$$

22. _____

has zeros at $x = 1 + \sqrt{3}$ and $x = 1 - \sqrt{3}$.

Find b . Write your answer as an integer or fraction in lowest terms.

23. Evaluate

$$\ln(\sqrt{e}).$$

23. _____

Write your answer as an integer or fraction in lowest terms.

24. Evaluate each of the following.

(a) $\tan\left(\frac{5\pi}{6}\right)$

24(a). _____

(b) $\sec(3\pi)$

24(b). _____

(c) $\sin(-225^\circ)$

24(c). _____

BARUCH COLLEGE
MATH 2001, DAY, FORM A, PART 2

NAME: _____

SIGNATURE: _____

INSTRUCTOR/SECTION: _____

PART 2: You ARE allowed to use a calculator on this part of the exam.**DIRECTIONS:** Write your name and instructor/section number on the line above and sign your name.

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Problems 101 – 106 are multiple choice. **CIRCLE** your answer (A, B, C, D, or E) and **MARK** your answer on the Scantron sheet as Problems 101 through 106 on the **BACK** of your Scantron.

Problems 107 – 110 are free response problems. **WRITE** your answer in the blank space underneath the problem statement.

You will have 30 minutes to complete Part 2.

101. In the year that a certain cafe first opened, the price of a cup of coffee is \$2.25. 10 years after the cafe opened, the price of a cup of coffee is \$2.65. Find a linear equation of the form $P = mt + b$ which gives the relationship between the price of a cup of coffee, P , and the number of years since the cafe opened. 101._____

(A) $P = -0.04t + 2.65$ (B) $P = 25t + 2.25$ (C) $P = 0.04t + 2.25$

(D) $P = 0.04t - 0.09$ (E) $P = -0.04t + 3.05$

102. Let 102._____

$$f(x) = 2\sqrt{x} - 23$$

and let

$$g(x) = e^{2x}.$$

Evaluate $g \circ f(169)$.

Round your answer to the nearest hundredth.

(A) 492.81 (B) 562.34 (C) 421.98 (D) 403.43 (E) 598.02

103. Alice is investing money in an account that offers an annual interest rate of 3% compounded continuously. What should Alice's *initial* investment be if she wants to have \$2,000 in the account after 5 years? Round your answer to the nearest HUNDREDTH of a dollar. 103._____

(A) \$1672.90 (B) \$1694.03 (C) \$1721.42
(D) \$1785.61 (E) \$1839.01

104. A camera at ground level is 1000 feet away from the bottom of a building which is 300 feet tall. The camera is pointed at the top of the building. Determine the the angle between the ground and the camera's line of sight. Round your answer in degrees to the nearest hundredth. 104._____

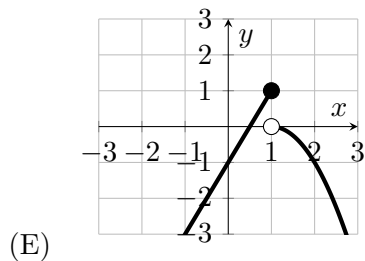
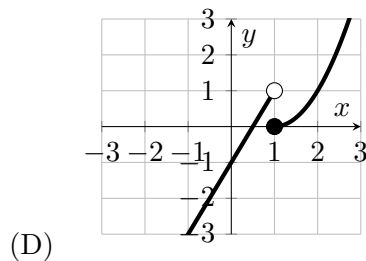
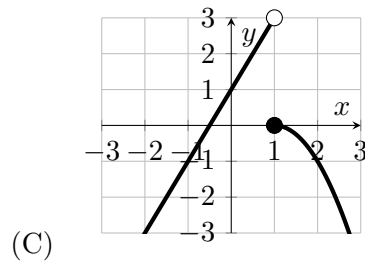
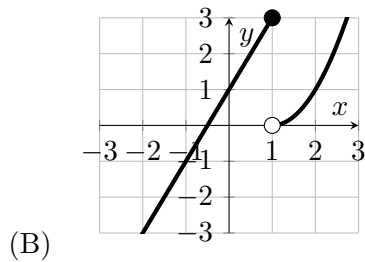
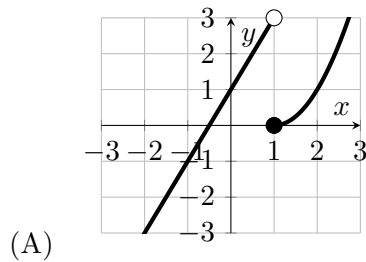
(A) 11.42° (B) 12.89° (C) 14.51° (D) 15.06° (E) 16.70°

105. Let

105. _____

$$f(x) = \begin{cases} 2x + 1, & x < 1 \\ (x - 1)^2, & x \geq 1 \end{cases}$$

Which of the following is a graph of $y = f(x)$?



106. Find the standard form of a quadratic equation whose graph is a parabola passing through $(0, 11)$ and with vertex $(2, -1)$.

106. _____

- (A) $y = -3(x + 2)^2 + 1$ (B) $y = 11(x + 2)^2 - 1$ (C) $y = -11(x - 2)^2 + 1$
 (D) $y = 3(x - 2)^2 - 1$ (E) $y = (x - 2)^2 + 11$

107. Solve for x :

$$e^{3x-1} = 10.$$

107._____

Round your answer to the nearest HUNDREDTH (two digits to the right of the decimal point).

108. Solve for x :

$$8 \sin x - 2 = 5 \sin x$$

108._____

for $0 < x < \frac{\pi}{2}$. Write your answer in radians.

Round your answer to the nearest HUNDREDTH (two digits to the right of the decimal point).

109. Evaluate $\log_5(209)$.

109. _____

Round your answer to the nearest HUNDREDTH (two places to the right of the decimal point).

110. The height, in feet, of a projectile at time t seconds is given by

110. _____

$$h(t) = -16t^2 + 80t + 200.$$

Find the **maximum height** of the projectile.

Write your answer as an INTEGER.