

Math 2003 Practice Final 1, Page 1
BARUCH COLLEGE
Math 2003 Practice Final 1, Part 1, NO CALCULATORS

1. Find the slope of a line which is *perpendicular* to $3x - 4y + 1 = 0$. 1. _____
(A) $-\frac{4}{3}$ (B) $\frac{4}{3}$ (C) $\frac{3}{4}$ (D) $\frac{1}{4}$ (E) $-\frac{1}{4}$

2. For the function $f(x) = 11x^2$, calculate the difference quotient 2. _____
$$\frac{f(x+h) - f(x)}{h}$$

- (A) $22x$ (B) $11x^2 + h$ (C) $22x + 11h$ (D) $22xh + 11h^2$ (E) $11h^2$

3. Find the vertex of the parabola $y = x^2 - 10x + 13$ 3. _____
(A) (0, 13) (B) (5, 13) (C) (2, 5) (D) (2, -3) (E) (5, -12)

4. Find the radius of the circle: $x^2 + y^2 + 14x - 2y = 0$. 4. _____
(A) 5 (B) 25 (C) $\sqrt{50}$ (D) 10 (E) $\sqrt{14}$

5. Determine the horizontal asymptote of the function 5. _____
$$y = \frac{x - 7}{x^2 - 49}$$

- (A) $y = 0$ (B) $y = 1$ (C) $y = 7$ (D) $y = 49$ (E) $y = -7$

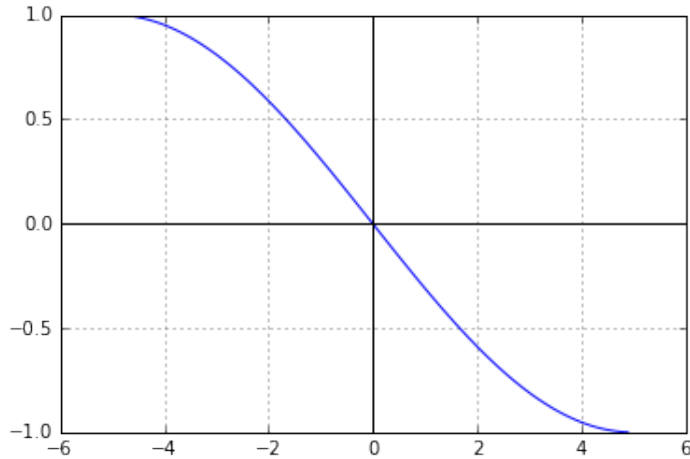
6. The demand equation for a particular item is given by $p = 100 - 2x$, where x is the number of items demanded and p is the price of the item. How many items should be sold to maximize **revenue**? 6. _____
(A) 60 (B) 75 (C) 10 (D) 25 (E) 100

7. Find the point where the graph of $f(x) = -4x^2 + 32x - 10$ has a horizontal tangent line. 7. _____
(A) (4, 54) (B) (4, 0) (C) (2, 0) (D) (0, -10) (E) (2, 38)

8. If $f(x) = \frac{x+1}{x}$, calculate $f'(2)$. 8. _____
(A) $-3/2$ (B) $1/2$ (C) 0 (D) $-1/4$ (E) 1

9. Find the equation of the tangent line to $y = x^3 - x$ when $x = 1$. 9. _____
(A) $y = 3x + 1$ (B) $y = -x + 1$ (C) $y = x + 4$ (D) $y = x$ (E) $y = 2x - 2$

10. Which of the following statements could be true about the function $f(x)$ graphed below? 10. _____



- (A) $f'(0) = 0$ (B) $f'(-1) < 0$ (C) $f'(-1) > 0$ (D) $f'(1) > 0$ (E) None of them.

11. Evaluate the limit: 11. _____

$$\lim_{x \rightarrow 3} \frac{x - 3}{x^2 + 4x - 21}$$

- (A) 7 (B) 1/10 (C) 1 (D) 1/6 (E) It does not exist

12. For which value of c would the function below be continuous on $(-\infty, \infty)$? 12. _____

$$f(x) = \begin{cases} x^2 - c & , x \leq 5 \\ cx + 6 & , x > 5 \end{cases}$$

- (A) 0 (B) 19/6 (C) 3/2 (D) 5 (E) 25

13. Evaluate the limit 13. _____

$$\lim_{x \rightarrow 1^-} \frac{x}{1 - x}$$

- (A) $-\infty$ (B) -1 (C) 0 (D) 1 (E) $+\infty$

14. Suppose the differentiable function $f(x)$ satisfies: $f(2) = 3$ and $f'(2) = 5$. Calculate the derivative of $xf(x)$ when $x = 2$. 14. _____

- (A) 15 (B) 5 (C) 12 (D) 13 (E) 8

15. Calculate the derivative of $f(x) = \sqrt{x^2 + 1}$. 15. _____

- (A) 1 (B) x (C) $\frac{1}{2\sqrt{x^2+1}}$ (D) $\frac{x}{\sqrt{x^2+1}}$ (E) $\frac{x}{x^2+1}$

16. For the given cost function $C(x) = 324 + 50x + x^2$, find the average cost at production level $x = 100$. 16. _____

- (A) 146 (B) 172.28 (C) 198 (D) 153.24 (E) 156.75

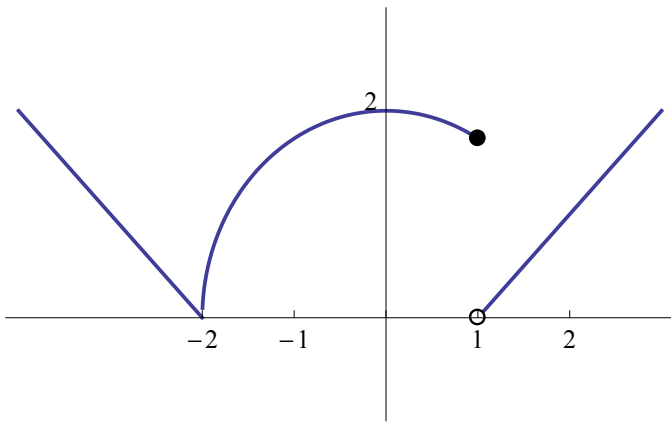
17. Calculate $\frac{dy}{dx}$ at the point $(6, 1)$ for the curve $xy^3 + y = 7$. 17. _____

- (A) -6 (B) -1/19 (C) -1/12 (D) 0 (E) -3

18. If $y = 6x^3$, determine $\frac{dy}{dt}$ when $x = 1$ and $\frac{dx}{dt} = -4$. 18. _____

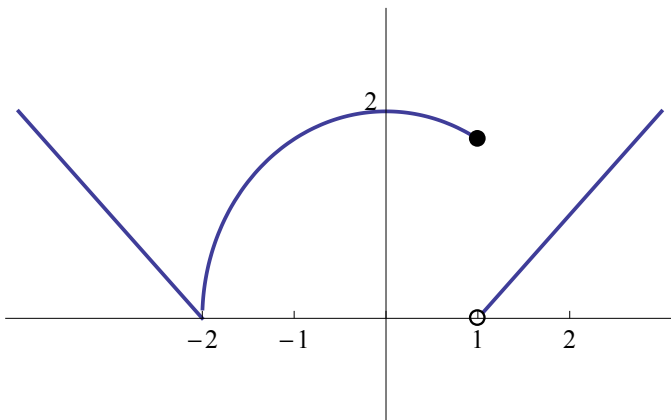
- (A) -8 (B) -5 (C) 0 (D) 32 (E) -72

19. Let $f(x)$ be the function whose graph is shown below. For which of the following values of x is $f(x)$ not CONTINUOUS? 19. _____



- (A) $x = 0$ only (B) $x = 0, x = -2$, and $x = 1$ (C) $x = -2$ and $x = 1$
 (D) $x = 1$ only (E) $x = -2$ only

20. Let $f(x)$ be the function whose graph was shown is shown below. For which of the following values of x is $f(x)$ not DIFFERENTIABLE? 20. _____



- (A) $x = 0$ only (B) $x = 0$ and $x = -2$ and $x = 1$ (C) $x = -2$ and $x = 1$
 (D) $x = 1$ only (E) $x = -2$ only

21. Calculate the reduced row echelon form (RREF) of the matrix: $A = \begin{pmatrix} 1 & 1 & 1 \\ 1 & 2 & 1 \end{pmatrix}$ 21._____

(A) $\begin{pmatrix} 1 & 1 & 1 \\ 0 & 0 & 0 \end{pmatrix}$ (B) $\begin{pmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \end{pmatrix}$ (C) $\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \end{pmatrix}$

(D) $\begin{pmatrix} 1 & 2 & 1 \\ 0 & 0 & 0 \end{pmatrix}$ (E) $\begin{pmatrix} 1 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix}$

22. Let $A = \begin{pmatrix} 5 & -1 \\ 3 & 2 \end{pmatrix}$ and let $B = \begin{pmatrix} 2 & 0 \\ 2 & 1 \end{pmatrix}$. Calculate $A^2 - B$. 22._____

(A) $\begin{pmatrix} 8 & -7 \\ 4 & 0 \end{pmatrix}$ (B) $\begin{pmatrix} 23 & 1 \\ 7 & 3 \end{pmatrix}$ (C) $\begin{pmatrix} 20 & -7 \\ 19 & 0 \end{pmatrix}$ (D) $\begin{pmatrix} 20 & -2 \\ 7 & 2 \end{pmatrix}$ (E) $\begin{pmatrix} 8 & -2 \\ 4 & 3 \end{pmatrix}$

23. Which of the following statements can be true when solving a system of linear equations containing 4 variables and 3 equations? 23._____

I. There are no solutions.

II. There is a unique solution.

III. There are an infinite number of solutions.

(A) I only (B) II only (C) III only (D) I and III (E) I, II, and III

24. Write the domain of the function $f(x) = \frac{1}{\sqrt{x}}$ in interval notation. 24._____

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

25. If $f(x) = x^3$ and $g(x) = x + 2$, calculate $f(g(-3))$. 25._____

(A) -1 (B) -2 (C) -8 (D) 4 (E) 2

26. A manufacturer discovers that it costs \$1400 to produce 1500 items and \$1700 to produce 1900 items. Assuming that cost is a linear function of the number of items, how much would it cost to produce 2000 items? 26. _____

(A) \$1800 (B) \$1750 (C) \$2000 (D) \$1700 (E) \$1775

27. The profit in dollars when producing x -units of some commodity is 27. _____

$$P = -35x^2 + 1365x - 11830$$

What is the minimum number of items which must be produced to break even?

(A) 13 (B) 15 (C) 20 (D) 17 (E) 19

28. You are provided with a supply curve and a demand curve, where p is the unit price for x items. Find the price at market equilibrium. 28. _____

$$506p + 90x = 2590$$

$$530p - 10x = 1070$$

(A) 14.2751 (B) 2.3161 (C) 12.3333 (D) 1.8726 (E) 5.4712

29. A company wants to understand the relationship between the amount spent on advertising, A , and total sales S . Suppose that the company collected data as shown in the table below: 29. _____

A	2000	3000	4000	5000
S	480,000	670,000	710,000	750,000

Using linear regression (with A being your x -variable), predict the amount of sales that would result from an advertising budget of \$10,000.

(A) 1,205,000 (B) 1,500,000 (C) 1,475,000 (D) 900,000 (E) 2,250,000

30. A particle is moving along the curve $s(t) = (t^2 - 1)^4$. What is the instantaneous rate of change of the position of the particle when $t = 0.5$? 30. _____

(A) 0 (B) -0.5 (C) -1.6875 (D) -0.333 (E) -1.75

31. Calculate A^{-1} if $A = \begin{pmatrix} 1 & 3 \\ 1 & 2 \end{pmatrix}$ 31. _____

(A) $\begin{pmatrix} -2 & 3 \\ 1 & -1 \end{pmatrix}$ (B) $\begin{pmatrix} 2 & -3 \\ -1 & 1 \end{pmatrix}$ (C) $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$

(D) $\begin{pmatrix} 1 & 1/3 \\ 1 & 1/2 \end{pmatrix}$ (E) It does not exist.

32. Solve the following system of equations: 32. _____

$$\begin{aligned} x + 4y - 3z &= 7 \\ 2x + z &= 4 \\ 3x - y + z &= 3 \end{aligned}$$

The answers are written in the form (x, y, z)

- (A) (3, 1, 0) (B) (2, 5/4, 0) (C) (15/11, 26/11, 14/11) (D) (1, 2, 3) (E) Infinitely many solutions exist

33. If $C(x) = 3x^4 - 5x^3 + 3x + 4$ is the cost function to produce x items, find the **cost** 33. _____
when the marginal cost is 4.

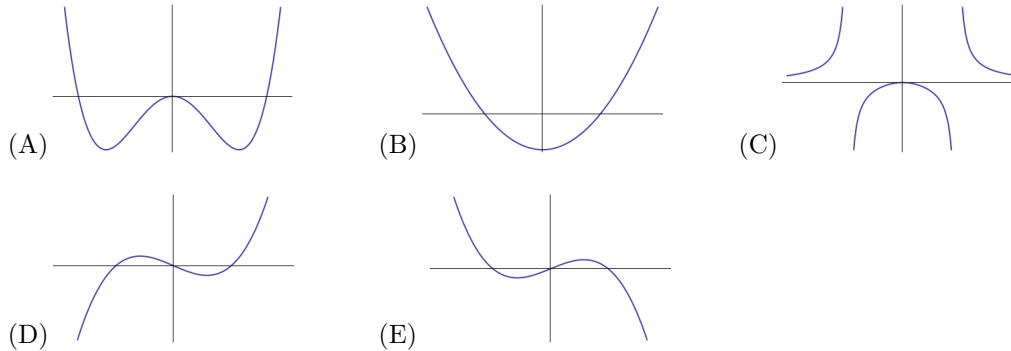
- (A) 1.50 (B) 2.85 (C) 4.75 (D) 5.48 (E) 7.88

34. The table below gives values of a differentiable function f . What is the approximate 34. _____
value of $f'(4)$?

x	$f(x)$
3.998	1.31625
3.999	1.31616
4.000	1.31607
4.001	1.31598
4.002	1.31589

- (A) 1.316 (B) 0.325 (C) 0.872 (D) -0.6 (E) -0.09

35. The graph of $y = x^4 - 6x^2$ looks like: 35. _____



Math 2003 Practice Final 1, Answers

1. A
2. C
3. E
4. C
5. A
6. D
7. A
8. D
9. E
10. B
11. B
12. B
13. E
14. D
15. D
16. D
17. B
18. E
19. D
20. C
21. B
22. C
23. D
24. B
25. A
26. E
27. A
28. B
29. A
30. C
31. A
32. C
33. D
34. E
35. A