MTH 1030 SAMPLE FINAL B
BARUCH COLLEGE
DEPARTMENT OF MATHEMATICS
SPRING 2010

PART I (NO PARTIAL CREDIT, NO CALCULATORS ALLOWED).
ON THE FINAL EXAM, THERE WILL BE 25 MULTIPLE CHOICE QUESTIONS ON THIS PART, WITH PROBLEMS SIMILAR TO OR SLIGHTLY DIFFERENT FROM ANY OF THE FOLLOWING:

1. For $f(x) = 2x - 2$ and $g(x) = -x^2 + 1$, find the composite function defined by $(f \circ g)(x)$.

1. _____

a) $-2x^2$ b) $-4x^2 + 2x - 2$ c) $4x^2 - 8x + 4$ d) $2x^2 - 2$ e) $-2x^2 + 1$

2. Solve: $\frac{x}{x-4} \le 0$

2. _____

a) $(-\infty,-0) \cup (4,\infty)$ b) $[0,4)$ c) $[0,4]$ d) $(-\infty,0] \cup (4,\infty)$ e) $(-\infty,0] \cup [4,\infty)$

3. Solve for x: $\log_3 x + \log_3 (x+6) = 3$

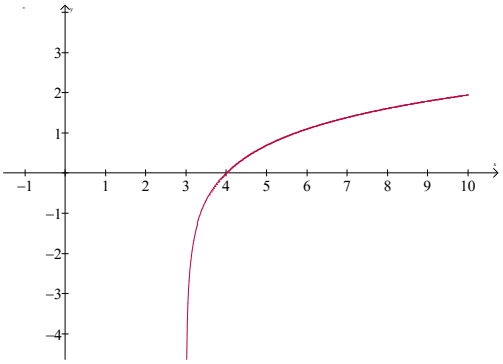
3. _____

a) $x = -3$ only b) $x = 9$ only c) $x = 3$ and $x = -9$ d) $x = 3$ only e) $x = -3$ and $x = 9$

4. The graph below represents a shift of the graph of $y = \ln x$. Which of the following is the best choice for the graph's equation?
[Hint: Try sketching the graph of $y = \ln x$ on the same axes below, to help you see the shift.]

4. _____

a) $y = \ln(x-4)$
b) $y = \ln(x-3)$
c) $y = \ln(x+3)$
d) $y = \ln(x) + 4$
e) $\ln 4x$



5. Solve for x: $\log_2 \frac{1}{x+1} = -1$

5. _____

a) $x = -1$ only b) $x = 3$ only c) $x = 1$ only d) $x = -3$ only e) $x = 1$ and $x = 3$

6. Find the x-intercepts and vertex for $f(x) = 2x^2 + 4x - 30$. 6._____

a) x-intercepts $(-3, 0)$ and $(-5,0)$; vertex $(-2, -16)$
b) x-intercepts $(3, 0)$ and $(5,0)$; vertex $(-1, -32)$
c) x-intercepts $(3, 0)$ and $(-5,0)$; vertex $(-1, -32)$
d) x-intercepts $(3, 0)$ and $(-5,0)$; vertex $(-2, -16)$
e) x-intercepts $(-3,0)$ and $(-5,0)$; vertex $(-1, -32)$

7. Solve for x: $3^{2x-3} = 27^{x-2}$ 7. _____

a) $x = 3$ b) $x = -1$ c) $x = -3$ d) $x = -9$ e) $x = 1$

8. Perform the operation and express your answer in *simplest complex form*. $(3+5i)(2-i)$.
8._____

a) $11+7i$ b) $6+7i-5i^2$ c) $1+7i$ d) $11-7i$ e) $1-7i$

9. What are the center and radius of $x^2 + y^2 - 2x + 6y = 3$? 9. _____

a) $(1,-3), r = 13$ b) $(-1,3), r = 13$ c) $(1,-3), r = \sqrt{13}$ d) $(-1,3), r = \sqrt{13}$ e) $(1,-3), r = 1$

10. Given the circle $x^2 + y^2 = 169$, what is the equation of the tangent line at the point (12, -5)?
10. _____

a) $-12x - 5y = -169$ b) $12x + 5y = -169$ c) $-12x + 5y = -169$
d) $5x + 12y = 169$ e) $-5x + 12y = 169$

11. Simplify $(2ab)^5$

a) $2a^5b^5$ 11. _____
b) $32a^5b^5$
c) a^5b^5
d) $10a^5b^5$
e) $10ab$

12. What is the minimum value of $y = x^2 - 4x - 6$? 12. _____

a) 12 b) -2 c) 6 d) -10 e) -6

13. Find the domain of $f(x)=\sqrt{3x-2}$ 13._____

a) $\{x \mid x \text{ is a real number and } x=\frac{2}{3}\}$ b) $\{x \mid x \text{ is a real number and } x\le\frac{3}{2}\}$

c) $\{x \mid x \text{ is a real number and } x\ge\frac{3}{2}\}$ d) $\{x \mid x \text{ is a real number and } x\le\frac{2}{3}\}$

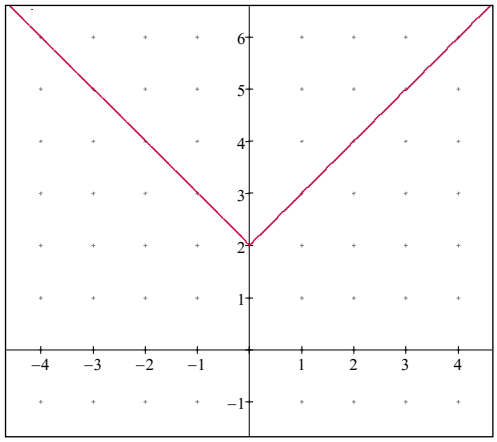
e) $\{x \mid x \text{ is a real number and } x\ge\frac{2}{3}\}$

14. Given the function $f(x) = x^2 + 3x + 4$. What can you say about the graph's x-intercepts?

14. _____

a) The graph has NO x-intercepts
b) The graph has ONE RATIONAL x-intercept
c) The graph has TWO RATIONAL x-intercepts
d) The graph has TWO IRRATIONAL x-intercepts
e) Not enough information is provided

15. Which equation best represents the graph below?. 15. _____



a) $y = x + 2$ b) $y = |x| + 2$ c) $y = |x+2|$ d) $y = |x|$ e) $y = x$

16. Solve: $x^{-2} + x^{-1} = 6$.

16. _____

a) $x=-\frac{1}{3}$ or $x=\frac{1}{2}$ b) $x=-2$ or $x=3$ c) $x=3$ only d) $x=\frac{1}{3}$ only e) $x=\frac{1}{6}$ only

17. Given the function $f(x) = x^3 - 6$, find $f^{-1}(x)$. 17._____

a) $f^{-1}(x) = x^{1/3} + 6$ b) $f^{-1}(x) = \dfrac{x^{1/3}+6}{6}$ c) $f^{-1}(x) = (x+6)^3$

d) $f^{-1}(x) = \dfrac{(x-6)^3}{6}$ e) $f^{-1}(x) = (x+6)^{1/3}$

18. Solve the system of equations: $\begin{aligned} 2x^2 + y^2 &= 24 \\ x^2 - y^2 &= -12 \end{aligned}$ 18. _____

How many real solutions are there to the system?

a) no solution b) 1 solution c) 2 solutions d) 3 solutions e) 4 solutions

19. Let $f(x) = -(x-3)^2 + 8$. Find the vertex and determine if it is a maximum or minimum. 19. _____

a) $(-3, -8)$ max b) $(-3, -8)$ min c) (3, 8) max d) (3,8) min e) (3, −8) max

20. Solve for x. $\sqrt{2x-1} + 2 = x$. 20. _____

a) 5 only b) 5 and 1 only c) no solution d) 1 only e) 0 only

21. Write as a single logarithm. Assume that all variables represent positive real numbers. 21. _____

$3\log x - \log y + 2\log z$

a) $\log x^3 yz^2$ b) $-\log x^3 yz^2$ c) $\log \dfrac{x^3}{yz^2}$ d) $\log \dfrac{x^3 z^2}{y}$ e) $-6\log x^3 yz^2$

22. Simplify $\sqrt{27x^9 y^3 z^5}$ (Assume that the variables do not have negative values.) 22. _____

a) $27x^4 yz^2\sqrt{xyz}$ b) $3x^4 yz^2\sqrt{3xyz}$ c) $3x^2 yz^2\sqrt{3x^7 y^2 z^4}$

d) $3x^8 y^2 z^4\sqrt{3xyz}$ e) $3x^2 yz^2$

23. Find the function $f(x)$ that describes the line containing (2,3) and (5,15). 23. _____

a) $f(x)=4x-5$ b) $f(x)=4x-6$ c) $f(x)=4x$ d) $f(x)=2x-3$ e) $f(x)=5-4x$

24. Solve: $a=-2a^2-2$. 24. _____

a) $\frac{1}{4}\pm\frac{1}{4}i$ b) $-\frac{1}{4}\pm\frac{1}{4}i$ c) $\frac{5}{4},-\frac{3}{4}$ d) $\frac{-1\pm i\sqrt{15}}{4}$

e) $\frac{-1\pm\sqrt{17}}{4}$

25. Rationalize the denominator. $\frac{9}{6+\sqrt{3}}$ 25. _____

a) $\frac{\left(6-\sqrt{3}\right)}{3}$ b) $3\left(6-\sqrt{3}\right)$ c) $\frac{3\left(6+\sqrt{3}\right)}{13}$ d) $\frac{3\left(6+\sqrt{3}\right)}{11}$ e) $\frac{3\left(6-\sqrt{3}\right)}{11}$

END OF PART I. PART II BEGINS ON NEXT PAGE.

PART II (CALCULATOR ALLOWED).
THIS PART OF THE FINAL EXAM WILL HAVE 10 MULTIPLE CHOICE QUESTIONS.

For problems #26 - #29, round your solution to the nearest HUNDREDTH and determine the digit in the TENTHS place of your solution. For example, if your solution were $x = 13.57$, then you would choose the answer "5", since 5 is the digit in the tenths place.

26. Solve the equation for x: $3^{2x-2} = 2$. Round your answer to the nearest HUNDREDTH. THE DIGIT IN THE **TENTHS** PLACE OF THE SOLUTION IS:

26. _____

a) 0 b) 7 c) 8 d) 4 e) 3

27. Solve the equation for x: $\log_2(x) + \log_2(x-3) = \log_2 3$. Round your answer to the nearest HUNDREDTH. THE DIGIT IN THE **TENTHS** PLACE OF THE SOLUTION IS:

27. _____

a) 7 b) 4 c) 6 d) 0 e) 5

28. Solve for x to the nearest hundredth: $e^{2x} - 3 = 16$. THE DIGIT IN THE **TENTHS** PLACE OF THE SOLUTION IS:

a) 3 b) 2 c) 6 d) 4 e) 9 28. _____

29. Solve for x to the nearest hundredth: $\ln(3x-4) = 7$. THE DIGIT IN THE **TENTHS** PLACE OF THE SOLUTION IS:

a) 2 b) 8 c) 4 d) 5 e) 9 29. _____

30. A virus is introduced to a population and spreads continuously at a rate of 26% per day. At first, 2 people are infected. Determine how many people are infected after 11 days.

Use the formula $A(t) = 2e^{0.26t}$, where t is the number of days since the virus was introduced. Round your answer to the nearest WHOLE NUMBER.

30. _____

a) 26 b) 2 c) 35 d) 52 e) 286

31. Evaluate: $\log_5 100$. Round your answer to the nearest HUNDREDTH. 31. _____

a) 5.00 b) 20.00 c) 2.86 d) 4.61 e) 1.61

32. A ball is thrown up from a height of 5 feet at an initial velocity of 30 feet per second. Its height after t seconds is given by $h(t) = -16t^2 + 30t + 5$. Determine the time it takes for the ball to hit the ground. Round your answer to the nearest HUNDREDTH.

a) 2.03 seconds 32. _____
b) 16.00 seconds
c) 0.94 seconds
d) 30.50 seconds
e) 53.10 seconds

33. Approximate the distance between the points (-3, 19), (-7, -5) to the nearest tenth:

a) 5.3 b) 6.3 c) 24.3 d) 17.2 e) 4.9 33. _____

34. An initial investment of $2250 is made into an account that is compounded continuously. If after 6 years the amount in the account is $3100, what is the interest rate to the nearest hundredth?

a) 5.34% 34. _____
b) 1.38%
c) 0.05%
d) 2.30%
e) 0.01%

35. Given a profit function $P(x) = -16x^2 + 1616x - 8000$, find the MAXIMUM PROFIT (round your answer to the nearest thousand).

35. _____

a) 8000 b) 33,000 c) 2000 d) 42,000 e) 15,000

END OF PART II.

ANSWERS TO MTH 1030 SAMPLE FINAL B (UPDATED SPRING 2010)

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