

MTH 1030 SAMPLE FINAL A  
BARUCH COLLEGE  
DEPARTMENT OF MATHEMATICS  
Fall 2011

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) Find the distance between the points  $(-4, -7)$  and  $(6, -1)$

a) 64

b)  $2\sqrt{17}$

c)  $3\sqrt{2}$

d) 4

e)  $2\sqrt{34}$

2) Simplify:  $\sqrt{320k^7q^8}$

a)  $(8k^3q^4)\sqrt{5}$

b)  $(8q^4)\sqrt{5k^7}$

c)  $(8k^3q^4)\sqrt{5kq}$

d)  $(8k^7q^8)\sqrt{5k}$

e)  $(8k^3q^4)\sqrt{5k}$

3) Simplify:  $\frac{\sqrt{7}}{7\sqrt{5}-\sqrt{7}}$

a)  $\frac{1}{34}(\sqrt{35}-1)$

b)  $\frac{1}{34}(\sqrt{5}+1)$

c)  $\frac{1}{36}(\sqrt{35}+1)$

d)  $\frac{1}{34}(\sqrt{35}+1)$

e)  $\frac{1}{34}(\sqrt{35}+7)$

4) Simplify:  $\left(\frac{16a^2b^{-6}}{a^{-2}b^2}\right)^{\frac{1}{4}}$

a)  $\frac{16a^4}{b^8}$

b)  $\frac{4b^2}{a}$

c)  $\frac{2a}{b^2}$

d)  $2ab^2$

e)  $\frac{4a}{b^2}$

5) Simplify:  $(9+2i)(6-7i)$

a)  $-14a^2 - 51i + 54$

b)  $40 - 51i$

c)  $68 + 51i$

d)  $68 - 51i$

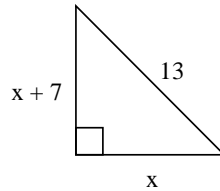
e)  $40 + 75i$

6) Use the properties of logarithms to rewrite:  $\log \frac{3\sqrt{x}}{4y^2}$

a)  $\log 2y - \log 4 + \log 3 + \frac{1}{2} \log x$     b)  $\log 3 + \frac{1}{2} \log x - \log 4 - 2 \log y$     c)  $\log 4 + 2 \log y - 2 \log x + \log 3$

d)  $\log x^2 - \frac{1}{2} \log y$     e)  $3 \log x - 4 \log y$

7) Find  $x$  in the triangle below:



a) 13  
d) 5

b)  $\sqrt{104}$   
e) 12

c) 7

8) Express in the form  $a + bi$ :  $\frac{1-6i}{3-2i}$

a)  $\frac{1}{4} - 9i$

b)  $\frac{1}{3} - 3i$

c)  $1 + 3i$

d)  $\frac{15}{13} - \frac{16}{13}i$

e)  $9 + 4i$

9) If  $f(x) = 2x^2 - x + 6$ , find  $f(-3)$ :

a) -21  
d) 21

b) 9  
e) -9

c) 27

10) Find the center and radius of the circle:  $x^2 + y^2 + 5x - 6y - 2 = 0$

a) Center  $\left(-\frac{5}{2}, 3\right)$ , radius  $\frac{69}{4}$

b) Center  $\left(-\frac{5}{2}, 3\right)$ , radius  $\frac{\sqrt{69}}{2}$

c) Center  $\left(-\frac{5}{2}, 3\right)$ , radius  $\frac{13}{2}$

d) Center  $(-5, 3)$ , radius 6

e) Center  $(-5, 3)$ , radius 36

11) Solve the system of equations:

$$\begin{aligned}x^2 + y^2 &= 89 \\x^2 - y^2 &= -39\end{aligned}$$

- a)  $(5, -8), (5, 8)$
- b)  $(-5, -8), (-5, 8)$
- c)  $(-5, -8), (-5, 8), (5, -8), (5, 8)$
- d)  $(-5, 0), (5, 0)$
- e) No real solution

12) Find the solution set of the inequality:  $t^2 - 2t - 3 \leq 0$

- a)  $[-1, 3]$
- b)  $(-3, 1)$
- c)  $[-3, 1]$
- d)  $(-\infty, -1] \cup [3, \infty)$
- e)  $(-\infty, -3] \cup [1, \infty)$

13) Solve for  $x$ :  $\sqrt{30x+15} = x+8$

- a)  $x=0$  only
- b)  $x=7$  only
- c)  $x=7$  and  $x=1$
- d)  $x=7$  and  $x=-7$
- e) No real solution

14) Given:  $y = (x-2)^2 - 9$ , find the  $y$ -intercept and  $x$ -intercept(s) (if any).

- a)  $y$ -intercept  $(0, -9)$ ;  $x$ -intercepts  $(5, 0), (-1, 0)$
- b)  $y$ -intercept  $(0, -9)$ ;  $x$ -intercepts  $(-5, 0), (1, 0)$
- c)  $y$ -intercept  $(0, -5)$ ;  $x$ -intercepts  $(5, 0), (-1, 0)$
- d)  $y$ -intercept  $(0, 9)$ ;  $x$ -intercepts  $(-5, 0), (1, 0)$
- e)  $y$ -intercept  $(0, -5)$ ;  $x$ -intercepts  $(2, 0), (-1, 0)$

15) Rationalize and evaluate when  $h = 0$ :  $\frac{\sqrt{16+h} - 4}{h}$

- a) 0
- b) 4
- c)  $\frac{1}{4}$
- d)  $\frac{1}{8}$
- e)  $\frac{1}{16}$

16) Solve for  $x$  by completing the square:  $x^2 + 8x + 9 = 0$

- a)  $x = -4$  or  $x = 4$
- b)  $x = 4$  only
- c)  $x = -7$  or  $x = -1$
- d)  $x = -4 + \sqrt{7}$  only
- e)  $x = -4 + \sqrt{7}$  or  $x = -4 - \sqrt{7}$

17) Solve for  $x$ :  $4^{x-1} = 16^{2x+1}$

- a)  $x = -2$
- b)  $x = -1$
- c)  $x = -\frac{2}{3}$
- d)  $x = 0$
- e)  $x = 4$

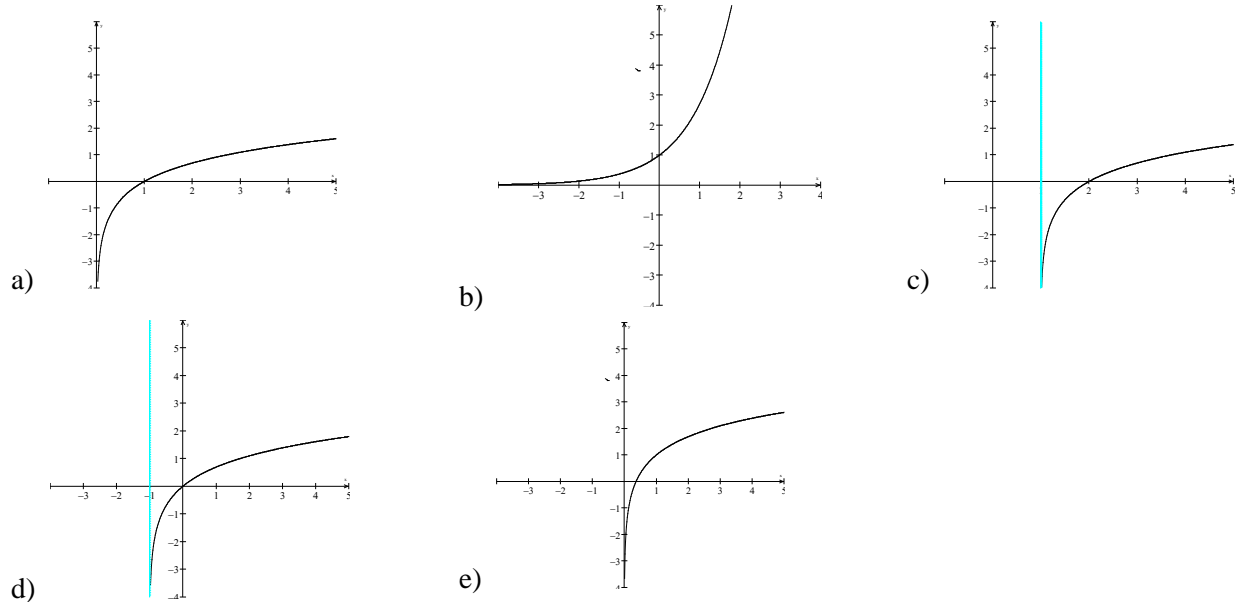
18) Solve for  $x$ :  $2x^2 + x + 2 = 0$

- a)  $x = 0$  only
- b)  $x = -1$  or  $x = 1$
- c)  $x = 1$  only
- d)  $x = -\frac{1}{4} + \frac{\sqrt{15}}{4}i$  or  $x = -\frac{1}{4} - \frac{\sqrt{15}}{4}i$
- e)  $x = -\frac{1}{4} + i$  or  $x = -\frac{1}{4} - i$

19) Given:  $y = x^2 - 2x - 3$ , find the coordinates of the vertex.

- a) (1, 4)      b) (2, -3)      c) (1, -4)      d) (0, -3)      e) (-1, 4)

20) Which of the following could be the graph of  $y = \ln(x - 1)$ ?



21) Simplify:  $4 - 7\sqrt{-9} - 2\sqrt{-36} - 8$

- a)  $-4 - 33i$   
 b)  $-4 + 33i$   
 c)  $4 + 33i$   
 d)  $-4 - 19i$   
 e)  $-4 + 19i$

22) Rationalize and evaluate when  $h = 0$ :  $\frac{\sqrt{2h+9}-3}{4h}$

- a) 0      b)  $\frac{1}{2}$       c)  $\frac{1}{4}$       d)  $\frac{1}{6}$       e)  $\frac{1}{12}$

23) Solve the inequality:  $\frac{x^2 - 4}{x^2 + 9} < 0$

- a)  $(-2, 2)$       b)  $(-\infty, -2) \cup (2, \infty)$       c)  $(-\infty, -2)$  only  
 d)  $[-2, 2]$       e)  $(-\infty, -2] \cup [2, \infty)$

24) Find the inverse of  $f(x) = 4x - 3$

a)  $f^{-1}(x) = \frac{1}{4}x + 3$

b)  $f^{-1}(x) = -4x + 3$

c)  $f^{-1}(x) = \frac{x+3}{4}$

d)  $f^{-1}(x) = \frac{x-3}{4}$

e)  $f^{-1}(x) = \frac{1}{3}x + 4$

25) Find the equation of the line that is tangent to the circle  $x^2 + y^2 - 4x + 6y + 3 = 0$  at the point  $(5, -4)$ .

a)  $y = 3x - 4$

b)  $y = -\frac{1}{3}x - \frac{7}{3}$

c)  $y = \frac{5}{4}x - \frac{41}{4}$

d)  $y = \frac{5}{4}x - 4$

e)  $y = 3x - 19$

PART II (CALCULATOR ALLOWED).

THIS PART OF THE FINAL EXAM WILL HAVE 10 MULTIPLE CHOICE QUESTIONS.

- 26) If \$7500 is deposited in a bank paying interest at an annual rate of 8% compounded continuously, how much will be in the account after 3 years and 9 months? (Assume no withdrawals are made.)
- \$7,506.17
  - \$10,123.60
  - \$10,123.94
  - \$150,641.53
  - \$274,486.76
- 27) Given the profit function,  $P(x) = -2x^2 + 240x - 6400$  where  $x$  is the number of items produced and sold, Find the number of items to be produced and sold when break-even occurs (i.e., profit = 0).
- 60 items
  - 40 items or 80 items
  - 120 items
  - 700 items
  - 6400 items
- 28) If you deposit \$1,000 at 8% compounded annually, how long will it take for your money to be tripled?
- 14.27 yrs
  - 13.73 yrs
  - 13.68 yrs
  - 9.01 yrs
  - 8.66 yrs
- 29) Solve for  $x$ :  $43x^2 - 52x = 14$
- $x = \frac{26 \pm 3i\sqrt{142}}{43}$
  - $x = \frac{26 \pm 6\sqrt{142}}{43}, (x \approx -1.058, 2.267)$
  - $x = \frac{-26 \pm 3\sqrt{142}}{43}, (x \approx -6.601, 7.810)$
  - $x = \frac{26 \pm 3\sqrt{142}}{43}, (x \approx -0.227, 1.436)$
  - None of these

**For the NEXT TWO PROBLEMS**, please solve the equation **to the NEAREST HUNDREDTH** and then choose the answer choice that represents the digit in the **TENTHS** place of your solution. **For example**, if your solution is  $x = 13.57$ , then you would choose the answer "5", since 5 is the digit in the tenths place.

- 30) Solve for  $x$  to the nearest hundredth:  $\ln(2x - 3) = 6$ . THE DIGIT IN THE **TENTHS** PLACE OF THE SOLUTION IS:
- 2
  - 5
  - 6
  - 7
  - 8
- 31) Solve for  $x$  to the nearest hundredth:  $3e^x + 4 = 5.6$ . THE DIGIT IN THE **TENTHS** PLACE OF THE SOLUTION IS:
- 1
  - 4
  - 5
  - 6
  - 7

- 32) A projectile is tossed directly upward from an initial height of 400 ft and with an initial velocity of 350 ft/sec. Its height above the ground as a function of time,  $t$ , is given by the equation

$$h(t) = -16t^2 + 350t + 400. \text{ To the nearest foot, find the **maximum height** of the projectile.}$$

[Please note that rounding might affect your answer. Pick the closest answer you find among the choices.]

- a) 11 ft                      b) 13 ft                      c) 400 ft                      d) 2307 ft                      e) 2313 ft

- 33) Dave and Sandy can paint a room together in 4 hours. Working alone, Dave can paint the room in 2 hours less time than Sandy can. APPROXIMATELY how long will it take Sandy to paint the room alone?

- a) 6.5 hrs                      b) 7.12 hrs                      c) 8.25 hrs                      d) 9.12 hrs                      e) None of these

**[Thank you to Professor Max Lee for this problem.]**

- 34) Find the interest needed for \$4500 to triple in seven years if the money is compounded annually (use  $A = P(1 + r)^t$ ).

- a) 0.17%                      b) 16.99%                      c) 0.16%                      e) 1.57%                      e) 15.69%

- 35) The annual cost  $C$  in dollars of manufacturing  $x$  snowboards at the Flying Carrot Snowboard Company is given by the function  $C(x) = 4x^2 - 1200x + 130,000$ . Find the **MINIMUM ANNUAL COST** for producing the snowboards.

- a) \$150                      b) \$1200                      c) \$40,000                      d) \$90,000                      e) \$130,000

END OF EXAM

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

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