

**Baruch College – Student Academic Consulting Center**  
**MTH 1030 SAMPLE FINAL EXAMINATION (2018 VERSION)**

*\* This sample examination is meant to be used as practice and does not necessarily reflect any actual examination questions. The scoring is 3 points each, no partial credit. If 34 or 35 questions are answered correctly, the score of 100 is awarded.*

Questions 1-25 are to be completed without a calculator.

1) Express:  $i^{30} - i^{34}$  in  $a + bi$  form.

a.  $i - 1$       b. 1      c. 0      d. 2      e.  $i + 1$       1)\_\_\_\_\_

2) Determine the center and the radius of the circle:  $x^2 - 6x + y^2 - y = 2$

a. Center:  $(-3, -\frac{1}{2})$  Radius:  $\frac{3\sqrt{5}}{2}$       b. Center:  $(3, \frac{1}{2})$  Radius:  $\frac{3\sqrt{5}}{4}$       c. Center:  $(3, \frac{1}{2})$  Radius:  $\frac{3\sqrt{5}}{2}$

d. Center:  $(-3, -\frac{1}{2})$  Radius:  $\frac{3\sqrt{5}}{2}$       e. Center: (6,1) Radius:  $\frac{45}{4}$       2)\_\_\_\_\_

3) Solve for  $x$ :  $5^{3x-1} = (\frac{1}{25})^{2x-1}$

a. 3/7      b. 4/13      c. 2      d. 1      e. 4/7      3)\_\_\_\_\_

4) Express the following as a sum of logarithms:  $\ln\left(\frac{\sqrt[3]{xy^5}}{z^9}\right)$

a.  $3 \ln x - \frac{1}{9} \ln z + \frac{1}{5} \ln y$       b.  $\frac{1}{3} \ln x - 9 \ln z + 5 \ln y$       c.  $\frac{1}{3} \ln x + 9 \ln z - 5 \ln y$

d.  $\ln x - 9 \ln z + 5 \ln y$       e.  $3 \ln x - 9 \ln z + 5 \ln y$       4)\_\_\_\_\_

5) Solve for  $x$ :  $\sqrt{x} = 6 - x$

a.  $x = 4, x = 9$       b.  $x = 9$  only      c.  $x = 4$  only      d.  $x = 0$       e. No real solution      5)\_\_\_\_\_

6) Determine  $f^{-1}(x)$  if  $f(x) = \sqrt[3]{x+1}$

a.  $(x-1)^3$     b.  $x^3 - 1$     c.  $\sqrt[3]{x-1}$     d.  $1 - x^3$     e.  $(x+1)^3$     6)\_\_\_\_\_

7) Determine  $g(f(x))$  if  $f(x) = 3x$  and  $g(x) = 4x^2$

a.  $36x^2$     b.  $12x^2$     c.  $4x^2 - 3x$     d.  $12x^3$     e.  $36x^3$     7)\_\_\_\_\_

8) Determine the vertex and intercepts of the function:  $f(x) = 2x^2 - 4x - 6$

a. Vertex:  $(1, -8)$     y-intercept:  $(0, -6)$     x-intercept:  $(-1, 0), (3, 0)$   
b. Vertex:  $(1, -8)$     y-intercept:  $(0, -6)$     x-intercept:  $(-3, 0), (1, 0)$   
c. Vertex:  $(2, -6)$     y-intercept:  $(0, 6)$     x-intercept:  $(-1, 0), (3, 0)$   
d. Vertex:  $(-1, 0)$     y-intercept:  $(0, 6)$     x-intercept:  $(-3, 0), (3, 0)$   
e. Vertex:  $(-1, -2)$     y-intercept:  $(0, -6)$     x-intercept:  $(-3, 0), (1, 0)$     8)\_\_\_\_\_

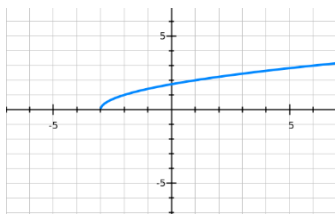
9) Solve the inequality:  $\frac{2-3x}{x^2-x} \leq 0$

a.  $(0, \frac{2}{3}] \cup (1, \infty)$     b.  $(-\infty, 0) \cup [\frac{2}{3}, 1)$     c.  $(0, -1] \cup (\frac{2}{3}, \infty)$   
d.  $(-\infty, -1) \cup [0, 1)$     e.  $(0, \frac{2}{3}]$     9)\_\_\_\_\_

10) Determine the type of  $x$ -intercepts that exist in the function:  $g(x) = 4x^2 - 5x + 10$

a. Two real rational    b. Two real irrational    c. One real rational  
d. Two complex (Non-real)    e. One real irrational    10)\_\_\_\_\_

11) Which of the following correctly displays the graph shown below?



a.  $f(x) = \sqrt{x+3}$     b.  $f(x) = \sqrt{x-3}$     c.  $f(x) = \sqrt{x} + 3$     d.  $f(x) = \sqrt{x} - 3$     e.  $f(x) = \ln(x+3)$

11)\_\_\_\_\_

12) Solve for  $x$ :  $x^2 + 8x = 7$

- a.  $-4 \pm \sqrt{7}$       b.  $-8 \pm \sqrt{23}$       c.  $4 \pm \sqrt{7}$       d.  $8 \pm \sqrt{23}$       e.  $-4 \pm \sqrt{23}$       12)\_\_\_\_\_

13) Rationalize the numerator and simplify completely. Then evaluate when  $k = 9$ :  $\frac{\sqrt{k}-3}{2k-18}$

- a.  $1/6$       b.  $1/12$       c.  $-12$       d.  $-6$       e.  $-1/12$       13)\_\_\_\_\_

14) Solve for  $x$ :  $x^{\frac{2}{3}} + x^{\frac{1}{3}} - 6 = 0$

- a.  $x = -8, x = 27$       b.  $x = -\frac{1}{3}, x = \frac{1}{2}$       c.  $x = -3, x = 2$   
 d.  $x = -27, x = 8$       e.  $x = -2, x = 3$       14)\_\_\_\_\_

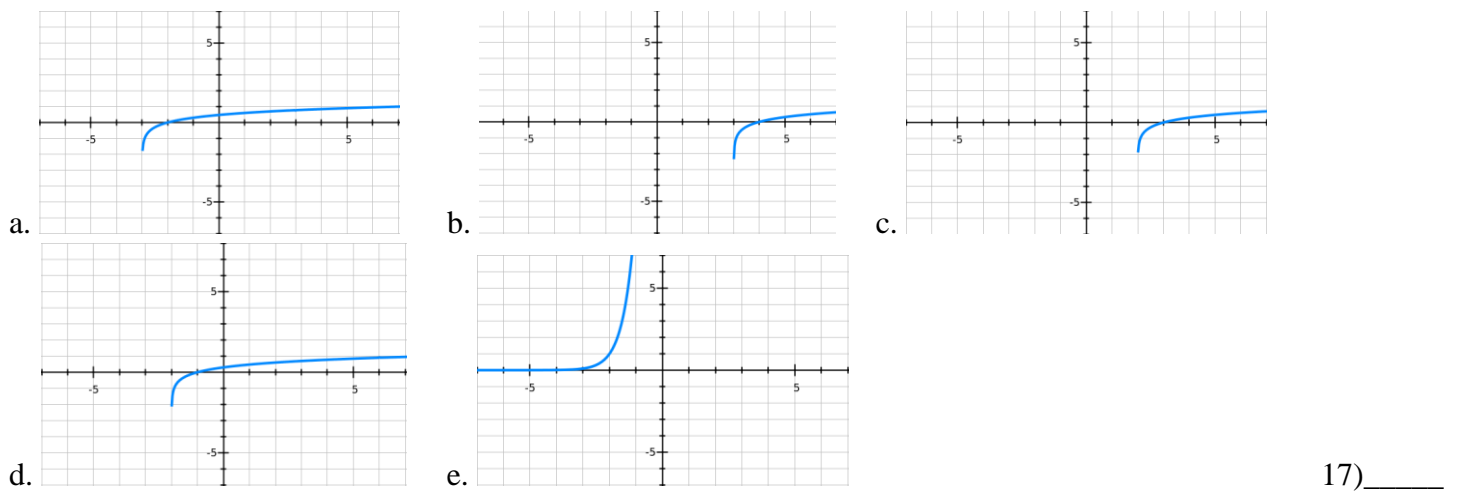
15) Expand and express in  $a + bi$  form:  $(3 - 6i)(2 + 3i)$

- a.  $3 - 24i$       b.  $12 + 3i$       c.  $-12 - 3i$       d.  $24 - 3i$       e.  $6 - 18i$       15)\_\_\_\_\_

16) Simplify completely:  $\sqrt{32x^5y^{18}}$

- a.  $4x^2y^9\sqrt{x}$       b.  $2x^2y^9\sqrt{2x}$       c.  $8x^2y^9\sqrt{2x}$       d.  $4x^2y^9\sqrt{6x}$       e.  $4x^2y^9\sqrt{2x}$       16)\_\_\_\_\_

17) Which of the following graphs is the closest display of:  $(x) = \log(x + 2)$  ?



18) Solve for  $x$ :  $\log(x + 2) + \log(x + 4) = \log 3$

- a.  $x = -1$  only      b.  $x = -5$  only      c.  $x = -5, x = -1$   
 d.  $x = 1$  only      e. No real solution exists

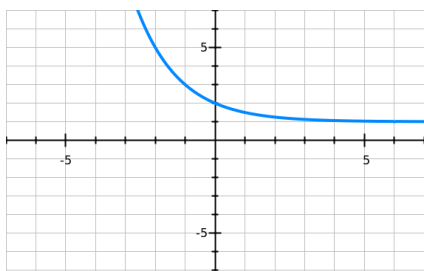
18)\_\_\_\_\_

19) Rationalize the denominator and express in  $a + bi$  form:  $\frac{7i}{3-4i}$

- a.  $-4 + 3i$       b.  $4 - 3i$       c.  $\frac{28}{25} - \frac{21}{25}i$       d.  $-\frac{28}{25} + \frac{21}{25}i$       e.  $\frac{28}{25} + \frac{21}{25}i$

19)\_\_\_\_\_

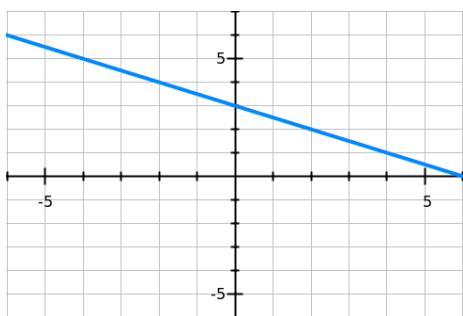
20) Which of the following functions is shown below?



- a.  $f(x) = 2^x + 1$       b.  $f(x) = \left(\frac{1}{2}\right)^x + 1$       c.  $f(x) = \log_{\frac{1}{2}}(x) + 1$   
 d.  $f(x) = x^2 + 1$       e.  $f(x) = \left(\frac{1}{2}\right)^{x+1}$

20)\_\_\_\_\_

21) Given the function  $f(x)$  shown below, what is the value of  $f^{-1}(4)$  ?



- a. 0      b. 1      c. -2      d. -1      e. 4

21)\_\_\_\_\_

22) Solve the following system:  $\begin{cases} x + y = 4 \\ 4x^2 - y^2 = -20 \end{cases}$

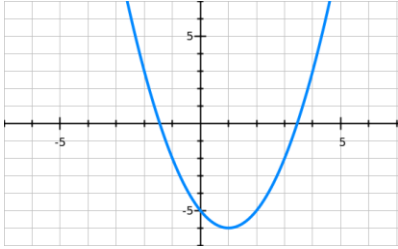
- a.  $(-2, 6)$  only      b.  $\left(-\frac{2}{3}, \frac{14}{3}\right)$  only      c.  $(-2, 6), \left(-\frac{2}{3}, \frac{14}{3}\right)$   
 d.  $(2, -6), \left(\frac{2}{3}, -\frac{14}{3}\right)$       e. No real solution

22)\_\_\_\_\_

23) Determine the equation of the line tangent to the circle:  $x^2 - 2x + y^2 + 6y + 2 = 0$  at the point:  $(3, -5)$ .

a.  $y = -2x + 1$       b.  $y = -x - 2$       c.  $y = x - 8$       d.  $y = 2x - 1$       e.  $y = x - 4$       23)\_\_\_\_\_

24) Which of the following functions illustrates the parabola shown below?



a.  $f(x) = \frac{1}{2}x^2 + 2x + 5$       b.  $f(x) = x^2 - 2x + 5$       c.  $f(x) = \frac{1}{2}x^2 - 2x - 5$   
d.  $f(x) = -x^2 + 2x - 5$       e.  $f(x) = x^2 - 2x - 5$       24)\_\_\_\_\_

25) How many solutions exist in the system:  $\begin{cases} x^2 + y^2 = 4 \\ x^2 - y^2 = 2 \end{cases}$  ?

a. Zero      b. One      c. Two      d. Three      e. Four      25)\_\_\_\_\_

*Questions 26-35 may require the use of a calculator.*

26) Evaluate  $\log_5 45$  to the nearest tenth.

a. 0.4      b. 1      c. 2.4      d. 2.2      e. 3.8      26)\_\_\_\_\_

27) Solve for  $x$ :  $\ln(3x - 7) = 4$ . Round your solution to the nearest thousandth. The DIGIT in the tenths place is:

a. 2      b. 7      c. 6      d. 3      e. 5      27)\_\_\_\_\_

28) Solve for  $x$ :  $8^{2x-1} = 3$ . Round your solution to the nearest thousandth. The DIGIT in the hundredths place is:

a. 1      b. 0      c. 7      d. 4      e. 6      28)\_\_\_\_\_

29) Determine the distance between the two points to the nearest hundredth: (5, 6), (10, 3)

a. 5.83      b. 0.6      c. 8      d. 4.9      e. 5.37      29)\_\_\_\_\_

30) How much money will be in an account if \$5000 was initially deposited after 10 years assuming the interest was being compounded daily at an annual rate of 5.5%?

a. \$8,243.60      b. \$1,218,405.40      c. \$8,665.90  
d. \$2,884.87      e. \$8540.72      30)\_\_\_\_\_

31) How long would it take for \$600 to double if it is deposited into an account that bears an annual rate of 3.8% compounded continuously?

a. 21.65 years      b. 25.47 years      c. 14.83 years      d. 28.91 years      e. 18.24 years      31)\_\_\_\_\_

32) The profit for producing  $x$  bags of popcorn is given by:

$$P(x) = -\frac{1}{2}x^2 + 50x - 1100$$

where  $P(x)$  is in dollars. How many bags of popcorn should be sold to break even?

a. 50      b. 33      c. 25      d. 68      e. 40      32)\_\_\_\_\_

33) Using the same function in QUESTION 32, what is the maximum profit when the optimal amount of popcorn is produced?

a. \$1100      b. \$25      c. \$100      d. \$50      e. \$150      33)\_\_\_\_\_



ANSWER KEY

1) c    2) c    3) a    4) b    5) c    6) b    7) a    8) a    9) a

10) d    11) a    12) e    13) b    14) d    15) d    16) e    17) d    18) a    19) d

20) b    21) c    22) c    23) c    24) e    25) e

26) c    27) e    28) e    29) a    30) c    31) e    32) b    33) e    34) c    35) b