Math 1101 Test 1 Practice Problems

These problems are not intended to cover all possible test topics. These problems should serve as an activity in preparing for your test, but other study is required to fully prepare. These problems contain some multiple choice question, please consult with your instructor for particular details about your class test.

Determine whether the given relationship defines a function. Explain your answer.

1) The temperature \( t \) on a backyard thermometer at 5 pm on a given day \( x \)

2) The temperature \( t \) on a backyard thermometer on a given day \( x \)

3) \[
\begin{array}{c|c}
  x & y \\
  1 & 2 \\
  9 & 1 \\
  1 & 3 \\
  7 & 8 \\
\end{array}
\]

Does the table define \( y \) as a function of \( x \)? What about \( x \) as a function of \( y \)?

State whether the graph is or is not that of a function.

4)

A) No  
B) Yes

Decide whether or not the set of ordered pairs defines a function.

5) \{(-3, -7), (-2, -2), (2, 2), (7, 2)\}
Decide whether or not the equation defines $y$ as a function of $x$.

6) $x = y^2 - 2$

A) No  B) Yes

Solve the problem.

7) Crafty Bill's Cool Car Sales opened as a used car sales lot in 1991. The graph shows the number of cars sold as a function of time. What is the domain of this function if we consider the indicated points?

8) Employees of a publishing company received an increase in salary of 7% plus a bonus of $900. Let $S(x) = 1.07x + 900$ represent the new salary in terms of the previous salary $x$. Find and interpret $S(13,000)$.

A) $13,900$; If an employee's old salary was $13,000, then his/her new salary was $13,900 after the increase and bonus.

B) $23,000$; If an employee's old salary was $23,000, then his/her new salary was $13,000 after the increase and bonus.

C) $11,308$; If an employee's old salary was $11,308, then his/her new salary was $13,000 after the increase and bonus.

D) $14,810$; If an employee's old salary was $13,000, then his/her new salary was $14,810 after the increase and bonus.
9) The following graph shows the stock price of a new internet company over the first 18 months after the initial public offering of its stock.

![Graph of stock price over 18 months]

Approximately in which month(s) did the stock price reach $60?

A) The 2nd and 10th months  
B) The 10th and 18th months  
C) The price never reached $60.  
D) The 18th month

Graph the function by plotting points.

10) \( y = -x^2 + 2x + 1 \)

![Graph of function by plotting points]

Graph the function with a graphing utility.

11) \( y = \frac{-3}{x - 6} \)

![Graph of function with a graphing utility]
Solve the problem.

12) The polynomial $0.0031x^4 +0.0051x^3 +0.0041x^2 +0.15x +1.22$ gives the predicted sales volume of a company, in millions of items, where $x$ is the number of years from now. Determine the predicted sales 20 years from now. Round your answer to the nearest hundredth million.

13) The polynomial function $I(t) = -0.1t^2 +1.4t$ represents the yearly income (or loss) from a real estate investment, where $t$ is time in years. After what year does income begin to decline?

A) 9.33  B) 7  C) 6  D) 14

Find the slope of the line through the pair of points.

14) (2, -6) and (1, -3)

A) $-\frac{1}{3}$  B) -3  C) $\frac{1}{3}$  D) 3

Decide whether the slope is positive, negative, zero, or undefined.

15) A) Zero  B) Negative  C) Undefined  D) Positive

Find the x- and y-intercepts of the graph of the given equation, if they exist. Then graph the equation.

16) $-3x - 18y = 18$
Find the slope of the line (if it exists) and the y-intercept (if it exists).

17) \(6x - 8y = -16\)

A) Slope \(\frac{3}{4}\), y-intercept (0, 2)  
B) Slope \(\frac{4}{3}\), y-intercept (0, -2)  
C) Slope \(-\frac{4}{3}\), y-intercept (0, 2)  
D) Slope \(-\frac{3}{4}\), y-intercept (0, -2)

Graph the equation.

18) \(y = \frac{3}{2}x - 1\)

Graph the equation.

Solve the problem.

19) The cost of tuition at a community college is given by \(C(x) = 462 + 50x\), where \(x\) is the number of credit hours. Find and interpret the \(C\)-intercept of the graph of this function.
   
   A) 50; The tuition increases by $50 for each additional credit hour.  
   B) 462; The tuition increases by $462 for each additional credit hour.  
   C) 50; There is a tuition fee of $50 in addition to the charge per credit hour.  
   D) 462; There is a tuition fee of $462 in addition to the charge per credit hour.

20) In one U.S. town the annual consumption, \(b\), of beef (in pounds per person) can be estimated by \(b = 37 - 0.6t\), where \(t\) is the number of years since 1975. What is the slope of the graph of this function? Write a sentence interpreting this value.

21) Assume that the sales of a certain appliance dealer are approximated by a linear function. Suppose that sales were $12,000 in 1982 and $54,000 in 1987. Let \(x = 0\) represent 1982. Find the equation giving yearly sales \(y\).
   
   A) \(S(x) = 42,000x + 54,000\)  
   B) \(S(x) = 8400x + 54,000\)  
   C) \(S(x) = 8400x + 12,000\)  
   D) \(S(x) = 42,000x + 12,000\)

22) Does every line have an \(x\)-intercept? If not, give an example of an equation whose graph does not have an \(x\)-intercept.
Write the slope-intercept form of the equation for the line passing through the given pair of points.

23) (-7, 6) and (1, -3)

Find the average rate of change for the function over the given interval.

24) \[ y = x^2 + 5x \] between \( x = 2 \) and \( x = 9 \)

A) 16  B) 14  C) \( \frac{112}{9} \)  D) 18

Solve the problem.

25) An electrician charges a fee of $40 plus $25 per hour. Let \( y \) be the cost in dollars of using the electrician for \( x \) hours. Find the slope-intercept form of the equation.

26) The following graph shows data for a recent train ride from New York to Toronto. At what rate did the train travel?

\begin{figure}
\centering
\includegraphics[width=0.5\textwidth]{train-graph.png}
\caption{Train travel data graph}
\end{figure}

A) 60 miles per hour  B) 65 miles per hour  C) 50 miles per hour  D) 120 miles per hour

Solve the equation by hand and then check your answer using Mathcad and one of the Tools.

27) \[ \frac{1}{6}(x + 18) - \frac{1}{7}(x - 7) = x + 5 \]

A) \( \frac{-133}{55} \)  B) \( \frac{119}{55} \)  C) \( \frac{203}{55} \)  D) \( \frac{-294}{55} \)

Write the best-fit linear model for the data.

28) The paired data below consist of the costs of advertising (in thousands of dollars) and the number of products sold (in thousands). Use linear regression to find a linear function that predicts the number of products sold as a function of the cost of advertising.

<table>
<thead>
<tr>
<th>Cost</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>85</td>
</tr>
<tr>
<td>2</td>
<td>52</td>
</tr>
<tr>
<td>3</td>
<td>55</td>
</tr>
<tr>
<td>4</td>
<td>68</td>
</tr>
<tr>
<td>2</td>
<td>67</td>
</tr>
<tr>
<td>5</td>
<td>86</td>
</tr>
<tr>
<td>9</td>
<td>83</td>
</tr>
<tr>
<td>10</td>
<td>73</td>
</tr>
</tbody>
</table>
Solve the problem.

29) The paired data below consist of the costs of advertising (in thousands of dollars) and the number of products sold (in thousands). Use the model obtained in the previous problem to predict the number of products sold (in thousands) if the cost of advertising is $6000.

<table>
<thead>
<tr>
<th>Cost</th>
<th>9</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>2</th>
<th>5</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>85</td>
<td>52</td>
<td>55</td>
<td>67</td>
<td>68</td>
<td>83</td>
<td>73</td>
</tr>
</tbody>
</table>

A) 16,795,800 products sold  
B) 69,540 products sold  
C) 72,540 products sold  
D) 79,240 products sold

Solve the system of equations using technology.

30) $3x - 2y = -1$  
$3x + 4y = 29$

Solve the system of equations by hand using any method.

31) $9x + 6y = 33$  
$-2x + 4y = -2$

A) $x = 3$, $y = 2$  
B) $x = 2$, $y = 2$  
C) $x = 3$, $y = 1$  
D) No solution

Solve the problem.

32) Nadine sold two kinds of tickets to her class play. Student tickets cost $4.00 each, and adult tickets cost $6.50 each. If Nadine sold a total of 35 tickets for $182.50, how many student tickets did she sell?

A) 18 tickets  
B) 22 tickets  
C) 17 tickets  
D) 20 tickets

33) A manufacturer has total revenue given by the function $R = 170x$ and has total cost given by $C = 289,000 + 30x$, where $x$ is the number of units produced and sold. Find the break-even number of units for the manufacturer.

A) 1445 units  
B) 200 units  
C) 140 units  
D) 2064 units

Determine if the vertex of the graph is a maximum point or a minimum point.

34) $y = -(x + 4)^2 - 1$

A) Maximum  
B) Minimum
Give the coordinates of the vertex and graph the equation.

35) \( y = -x^2 - 4x - 3 \)

Solve the problem.

36) John owns a hot dog stand. His profit, in dollars, is given by the equation \( P(x) = -x^2 + 10x + 34 \), where \( x \) is the number of hot dogs sold. What is the most he can earn?

A) $99  
B) $39  
C) $59  
D) $25