Answers to WSU 1010 REAL CE Midterm Review

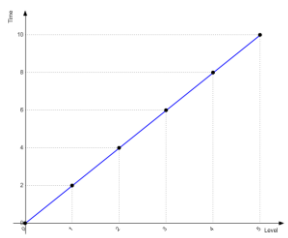
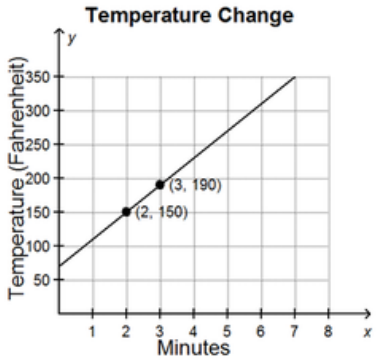
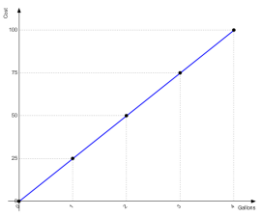
1. When considering the symbolic representation of a function, the domain consists of any input values that won't make the output undefined or imaginary. The practical domain, however, consists of the input values that make sense when considering the specific situation for which the function is defined.
2. The amount of reimbursement is 51 cents times the number of miles traveled from your office to campus and back.
3. a) The input variable is the number of miles traveled. b) The practical domain would be [0,100) or $0 \le x < 100$. c) The practical range would be [0, 5100), 5100 cents or $51.00.
4. No, for the same input or hours worked there could be 4 different outputs (wages received). In this case there isn't a unique output for each input.
5. $4x^3 - 21x^2 + 8x - 15$
6. $\frac{6zy^7}{x^3}$
7. $\frac{-6}{x^3}$
8. $4x^0 = 4$ since the base of the exponent is x so $x^0 = 1$ and $4(1) = 4$. $(4x)^0 = 1$ because the base of the exponent is 4x.
9. $-\frac{1}{8}$
10. $x^{\frac{1}{15}} = \sqrt[15]{x}$
11. $x^{\frac{11}{12}} = \sqrt[12]{x^{11}}$
12. $x^{\frac{4}{15}} = \sqrt[15]{x^4}$
13. $\sqrt[5]{y^4}$
14. $(xy^5z^2)^{\frac{1}{7}} = x^{\frac{1}{7}}y^{\frac{5}{7}}z^{\frac{2}{7}}$

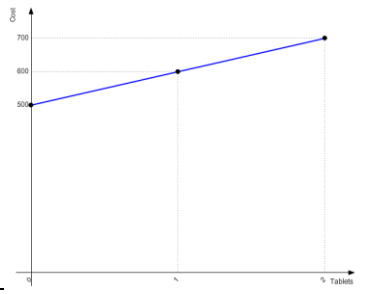
15. f(x) is linear; g(x) is not linear; h(x) is linear

16. Answers will vary.
a) Vertical lines are in the form $x = c$. The slope is undefined.
b) Horizontal lines are in the form $y = c$. The slope is zero.

17. a) 65 miles/hour; b) You are 65 miles farther from home for every 1 hour you drive; c) 310; d) You are 310 miles away from home at the beginning of the 3rd day.

18. Table

<table>
<tr><th></th><th>Numerically</th><th>Graphically – be sure to label your axes!</th><th>Symbolically</th><th>Verbally</th></tr>
<tr><td>Example A</td><td><table><tr><th>Time (min)</th><th>Water Level</th></tr><tr><td>2</td><td>4</td></tr><tr><td>3</td><td>6</td></tr><tr><td>4</td><td>8</td></tr><tr><td>5</td><td>10</td></tr></table></td><td>  </td><td>$L = 2T$
$L = level\ of\ the\ water$
$T = time\ in\ minutes$</td><td>For every minute, the water level goes up by 2 units</td></tr>
<tr><td>Example B</td><td><table><tr><td>Time (min)</td><td>Temp (F)</td></tr><tr><td>2</td><td>150</td></tr><tr><td>3</td><td>190</td></tr></table></td><td> 
</td><td>$T = 40M + 70$
$T = Temp\ in\ degrees\ Fahrenheit$
$M = time\ in\ minutes$</td><td>Every minute the temperature increases by 40 degrees Fahrenheit.</td></tr>
<tr><td>Example C</td><td><table><tr><td>Gallons of water</td><td>Cost in dollars</td></tr><tr><td>1</td><td>.25</td></tr><tr><td>4</td><td>1.00</td></tr><tr><td>8</td><td>2.00</td></tr></table></td><td>  </td><td>$C = .25g$
$g = gallons\ of\ water\ used$
$c = cost\ of\ water\ usage$</td><td>For every gallon of water used, you will pay $0.25</td></tr>
</table>

Example D	<table><tr><th>Tablets</th><th>Cost of production in dollars</th></tr><tr><td>0</td><td>500</td></tr><tr><td>1</td><td>600</td></tr><tr><td>2</td><td>700</td></tr></table>		$C = 100T + 500$ $C = cost\ of\ production$ $T = number\ of\ tablets\ produced$	The cost of production of a tablet is $100 dollars per tablet with an initial start-up cost of $500.

19. Answers will vary. For example, the cost of purchasing a certain number of dvds. The input can only be positive integers and no fractional numbers in between. The restriction on the domain will result only in certain values for the range as well. The graph would show points that are not connected.

20. $g(8) = 3$

21. $a = 3$

22. a. Infinitely many.
b. This means both equations are graphed as the exact same line.
c. No solutions.
d. This system would consist of two parallel lines.

23. a) yes b) no

24. a. (0,575) (33,1268)
b. $L = 21n + 575$ where L = the number of Lawyers in thousands and n = number of years since 1980
c. Every year since 1980, the number of lawyers has increased by 21 thousand.
d. $L = 21(20) + 575 = 995$, so 995 thousand lawyers.

25. a. Time
b. Amount
c. Yes, it passes the vertical line test.
d. No, it does not increase by the same amount every year.
e. increasing
f. Continuous. There is a continuous curve on this graph showing that we are not talking about discrete or separate periods of time (for example once a year). Instead all times throughout the year are represented on the graph.
g. D: $[0, \infty)$ R: $[1000, \infty)$
h. In 8 years there will be $1600.

26. *i.* Infinite solutions; diagram D
ii. No solutions; diagram F
iii. (2,0,1)*;* diagram A

iv. No solutions; diagram C

27. In the first expression, the exponent applies to both the 2 and the x and in the second expression the base of the exponent is just the x, so $2^{-1}x^{-3} \neq 2^{1}x^{-3}$

28. $-4 \cdot -4 \cdot -4 = -64$ so we are allowed to take a cube root of a negative number. However, when taking the *square root* of a number, there is no real number multiplied by itself that will give a negative product, so we cannot take the square root of a negative number.

29. Answers will vary but should be similar to the following:

$n = 2, a = 9, b = 4$ so we have $\sqrt[2]{9} + \sqrt[2]{4} = 3 + 2 = 5 \neq \sqrt[2]{9+4} = \sqrt[2]{13}$

30. a. $\sqrt[3]{36x^2y^2}$
b. $81 - \sqrt[3]{4}$
c. $52 + 14\sqrt{3}$

31. a. $4x\sqrt[4]{x^3}$
b. $6\sqrt[3]{2}$
c. $12\sqrt[3]{x}$

32. $\frac{5\sqrt{x}}{x^3}$

33. a. $7x + 4 + \frac{6}{x}$
b. $6y^2 + 2y - 1$
c. $r - 2$

34. An equation like this will have one answer, $y = 9$. An inequality like this will have an interval of $(-\infty, 9)$which represents an infinite number of answers.

35. $[-4, 3.5)$ 

36. By convention, the square root in this equation represents the positive or principal root of the number under the radical, and therefore cannot equal a negative number.

37. $x = 2$ Check: $10\sqrt{2+2} = 10(2) = 20$

38. $x = 1$ Check: $2\sqrt{3(1)} - \sqrt{5(1)+7} = 2\sqrt{3} - \sqrt{12} = 2\sqrt{3} - 2\sqrt{3} = 0$

More Procedural Practice

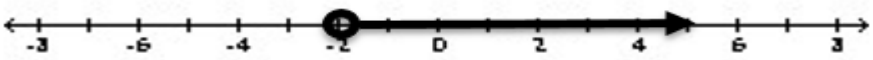
1. $C(5) = 30$

2. $x^3 - x^2 - 6x + 18$

3a. $(-4.5, 5)$
3b. $(3,1)$
4a. $y = -\frac{1}{2}x + 4$
4b. $y = 2x$
5a. x-int: (7.5, 0), y-int: (0, 5), $m = -\frac{2}{3}$
5b. x-int: (6, 0), y-int: (0, -4), $m = \frac{2}{3}$

6. $y = 3x + 10$, increasing because the slope is positive.
7. $\frac{2\sqrt{2az}}{3a}$
8. $x^2 + 8 + \frac{2}{x^2+1}$

9. $(-2, \infty)$



10. $x = -7$ Check: $\sqrt[3]{4(-7)+1} = \sqrt[3]{-27} = -3$