Ma 110 Exam 1 Review: Sections 1.1 - 1.4, 2.1 - 2.2, 2.5, 3.1 - 3.3

Do not rely solely on this work sheet! Make sure to study homework problems, other work sheets, lecture notes, and the book!!!

1. Section 1.1
   (a) Translate the geometric statement, "the distance from x to -5 on the number line is greater than 3", into an algebraic statement with absolute values.
   (b) Translate the algebraic statement, $|x+3| \leq 4$, into a geometric statement about distance on the number line.
   (c) Indicate the solution to $|x+3| \leq 4$ on the number line.
   (d) Write the number $|\sqrt{6}-5|$ with out using absolute values.
   (e) Find the distance between $-\frac{1}{5}$ and -6 exactly.
2. Section 1.2
   (a) Solve algebraically: $|x+3| \leq 4$
   (b) Solve for y **exactly**: $7[(2y-1)^3-5] = -21$
   (c) Solve by completing the square: $3x^2+5 = 12x$
   (d) Solve using any method: $4x-10 = 14-x^2$
   (e) Solve: $\frac{3}{x} = 1 - \frac{x}{x-3}$
   (f) Solve: $3z^2 = 2-4z^4$
3. Section 1.3
   (a) Find the distance in the Cartesian plane between the points $(-1,5)$ and $(3,-9)$
   (b) Find the center and radius of the circle $x^2+4x+y^2-3x-10=0$.
   (c) Find the midpoint of the line segment joining $(1,3)$ and $(-3,5)$.
   (d) Find the x- and y-intercepts of the graph of $x^2-2xy+3y^2=1$.
   (e) Find the equation of the circle if the endpoints of the diameter are $(-3,5)$ and $(7,-5)$.
4. Section 1.4
   (a) Find the equation of the line through $(-1,5)$ and perpendicular to the line $2x+3y-2=0$.
   (b) Find the equation of the line through $(-1,5)$ and parallel to the line $2x+3y-2=0$.
   (c) Find the rate of change $\frac{\Delta y}{\Delta x}$ for the line $y-5 = -2(x+6)$
   (d) Find the equation of the line through the points $(-3,-5)$ and $(2,-6)$ in point slope form.
   (e) Find a number k such that the slope of the line passing through the two points $(k,-3);(-5,8)$ is equal to -7.

5. Section 2.1 & 2.2

   (a) Sketch a complete graph of the equation, $3x^2 + 5y^2 = 15$, making certain to label your axes.

   (b) Determine the number of solutions to the equation $\sqrt{3x+8} + 3x = x^2 - 7$, and find the approximate solutions graphically.

   (c) Justify whether the equation $x^3 - 2\sqrt{x} = 5$ should be solved graphically or algebraically.

   (d) Find an approximate solution to the equation $\sqrt[4]{x^4 + 3x^2 - 3} = 0$ graphically and find an exact answer algebraically.

6. Section 2.5

   (a) Advertising expenditures in the United States (in billions of dollars) in selected years are shown in the table below. Two models are $y = 12x + 215$ and $y = 11x + 218$, where $x = 0$ corresponds to 2000.

Year	2001	2002	2003	2004
Amount	231	237	245	264

      i. Find the residuals and their sum;

      ii. Find the sum of the squares of the residuals;

      iii. Determine which model is the better fit.

   (b) Enrollment in public colleges (in thousands) in selected years is shown in the table below.

Year	2000	2001	2002	2004	2006	2008
Amount	15,313	15,928	16,612	17,095	17,664	18,350

      i. Find a linear model for this data, with $x = 0$ corresponding to 2000.

      ii. Use the model to estimate public college enrollment in 2005 and 2010.

      iii. According to this model, when will public college enrollment reach 21 million?

7. Section 3.1

   (a) Does the equality $x^2 - 3y = 6$ express x as a function of y or y as a function x.

   (b) Does the table represent a function? If so find the domain and range.

input	-1	5	-4	π	0
output	0	1.1	1.1	θ	3

   (c) Find an equation that expresses the area A of a circle as a function of the radius r.

   (d) A group of students drives from Cleveland to Seattle, a distance of 2350 miles, at an average speed of 52 mph.

      i. Express their distance from Cleveland as a function of time.

      ii. Express their distance from Seattle as a function of time.

8. Section 3.2

   (a) For the function $f(x) = 5x^2 + 1$, find $f(1)$, $f(x+1)$, and $f(\Omega)$.

   (b) Find the difference quotient for the function $f(x) = \sqrt{x}$ and simplify.

   (c) Find the difference quotient for the function $f(x) = 2 - x^2$ and simplify.

(d) For the function:

$$f(n) = \begin{cases} 2x + 3 & \text{if } x < 4 \\ x^2 - 1 & \text{if } 4 \leq x \leq 10 \end{cases}$$

Find $f(-5)$, $f(8)$, $f(k)$, and the domain of f.

(e) Find the domain of the function $f(x) = \dfrac{1}{x-2}$

(f) Find the domain of the function $f(x) = \dfrac{1}{\sqrt{x+2}}$

(g) Find the domain of the function $f(x) = \dfrac{\sqrt{x-2}}{x}$.

9. Section 3.3

(a) Make a sketch of the graphs $f(x) = x^n$ for n even and for n odd. Do not use a scale on your graphs.

(b) Sketch the graphs of $f(x) = mx + b$, $f(x) = |x|$, the Greatest Integer Function, and $f(x) = \sqrt{x}$

(c) Which of the following graphs pass the vertical line test?

i. $y = 3x^2 + 2$

ii. $x = 3y - 6$

iii. $x = 3y^2 + 2$

(d) Find the domain and range for each of the functions whose graphs are shown below.