MATH 1113 Precalculus
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Name:
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Practice Test No. 1

Show all of your work, label your answers clearly, and do not use a calculator.

Problem 1

a Describe in words what it means for a relation to be a function

b Does the relation $y^2 = x$ define y as a function of x?

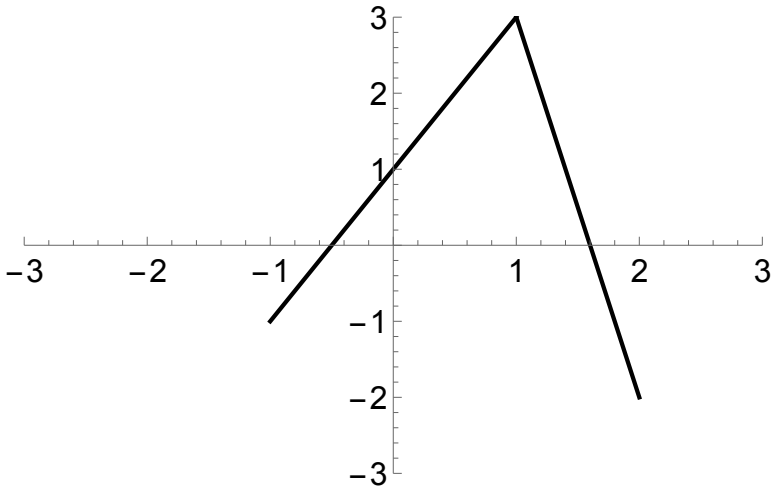
Problem 2 (25 points) Find the equations of the following lines:

a The line parallel to the y-axis going through the point $(-3, 2)$.

b The line perpendicular to $y = -2x + 2$ going through the point $(\frac{-3}{4}, \frac{5}{2})$.

c The line going through the two points $(-1, \frac{7}{5})$ and $(-3, -15)$.

Problem 3 (25 points) Given the graph of $f(x)$ below:



a Describe in words all of the graph transformations needed to transform $f(x)$ into $g(x) = 3f(-2x - 1)$.

b Graph the function $g(x) = 3f(-2x - 1)$.

Problem 4 (25 points) Graph each of the following functions:

a $f(x) = (3x + 2)^{1/3}$

b $g(x) = 2(-3x + 2)^3$

c $r(t) = -\sqrt{-x - 1} - 1$

Problem 5 For each of the following functions, say whether the function is even, odd, or neither.

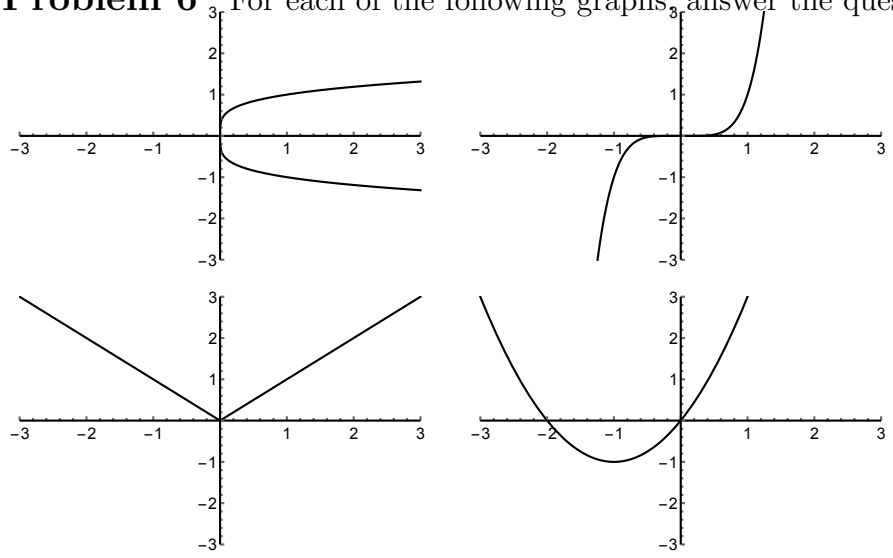
a $f(x) = x^2 - 1$

b $s(m) = \frac{m^2}{m^4 - 3m^2 + 1}$

c $g(t) = \frac{t}{t^2 + 1}$

d $y(x) = |x - 3|$

Problem 6 For each of the following graphs, answer the questions below.



a Can the graph be represented as the graph of a function of x?

b Is the graph symmetric across the origin?

c Is the graph symmetrix across the x-axis?

d Is the graph symmetrix across the y-axis?

Problem 7 A company founded in the year 0 started with 20 employees and hired 60 new employees every year for the next 30 years. For the next 6 years, they did not hire any new employees. For the next 10 years, they laid off 10 employees per year.

a Write an expression for the function $m(t)$ that represents the number of employees the company had in each year t.

b What is the domain of $m(t)$?

c What is the range of $m(t)$?

d What is the maximum of $m(t)$?

e Sketch a graph of the function $m(t)$.

Problem 8 Given the function $f(x) = -3x^2 + 5x + 15$.

a Determine the average rate of change of f on the interval $[0, 3]$

b Determine the average rate of change of f on the interval $[1, 2]$

Problem 9 Find the point on the line $y = 2x + 1$ closest to the point $(5, 3)$.