Math 1303: Practice Exam 1

This practice exam has many more questions that the real exam. The real exam will have 10 questions (some multi-part) of the type covered in this practice exam and in the homework and quizzes. If you have any questions, please email me.

1. Find the domain of the following functions:

   a. $f(x) = \frac{x}{x^2-6x+5}$ b. $f(x) = \frac{x-6}{\sqrt{2x-3}}$

   c. $f(x) = \log_2(x)$ d. $k(t) = \frac{2x^2-3x}{e^x}$

   e. $f(x) = \log_2(x-1)$

2. Suppose $f(x) = 2x^2 - 3$ and $g(x) = \frac{1}{x^2-1}$. Find the following quantities:

   a. $(f^\circ g)(x)$ b) $(g^\circ f)(x)$ c) $(f^\circ f)(x)$ d) $\frac{f(x)}{g(x)}$

3. Suppose $f(x) = 2x^2 - 3$. Compute (-2) , $f(3t)$, and $\frac{f(x+h)-f(x)}{h}$ (simplify your answer). Do the same for the function $f(x) = -3x + 6$.

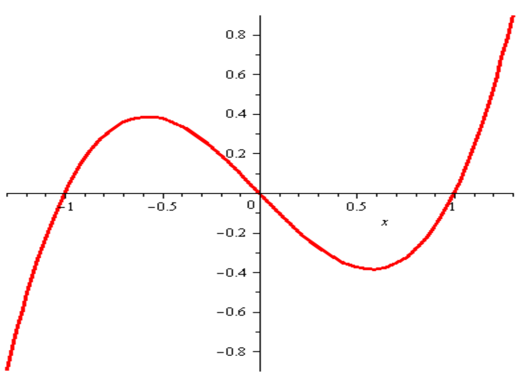
4. Let $h(x) = \begin{cases} 1-x & if\ \ x \geq 0 \\ 3x-2 & if\ \ x < 0 \end{cases}$ and $g(x) = \begin{cases} x^2 & if\ \ x < 0 \\ 2-2x & if\ 0 \leq x \leq 1 \\ 2-x^2 & if\ \ 1 < x \end{cases}$

   a. Find $h(-2)$ and $g(-2)$
   b. Find $h(0)$ and $g(1)$
   c. Graph the functions in two separate coordinate systems.

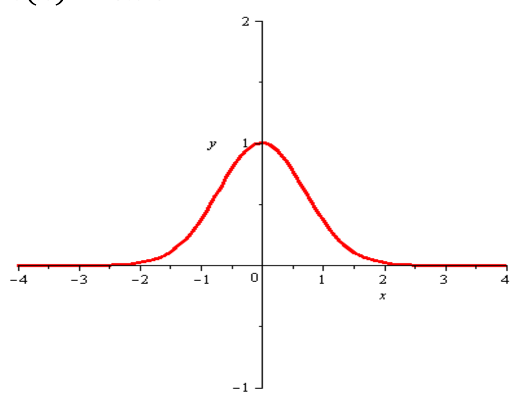
5. Decide whether the following functions are even, odd, or neither:

   a) $f(x) = 2x^4 - x^2 + 1$ b) $g(x) = \frac{x}{x^2-1}$

   b) $h(x) = (x^2-1)(x^3+1)$ d) $k(x) = 3x\, e^{x^2}$



e)



f)

6. Find the equation of a line satisfying the given conditions

   a. through $(-1,2)$ and $(2,3)$ b) through (3, 4) and (-2, 4)
   b. through the point $(3,1)$ parallel to the line $6x - 3y = 6$
   c. through the point (2, 1) perpendicular to the line $y = 3x - 1$
   d. with x-intercept 2 and y-intercept 4

7. Find the vertex, x-intercepts, y-intercepts and graphs for
   a) $y = 2x^2 - 4x + 1$ b) $y = x^2 - 7x - 18$ c) $y = -2x^2 - x - 1$

8. Solve the systems of equations, if possible

$$\begin{aligned} 2x - y &= 6 \\ 3x + 2y &= 5 \end{aligned}$$

$$\begin{aligned} 8x - 4y &= 7 \\ y &= 2x - 4 \end{aligned}$$

$$\begin{aligned} 2x - y &= 3 \\ -4x + 2y &= 8 \end{aligned}$$

9. Suppose a revenue function is $R(q) = 200q$ while the cost function is $C(q) = 250 + 100q$. Find the fixed cost and the break-even point(s).

10. If the supply and demand functions of a product are $120p - q - 240 = 0$ and $100p - q = 1200$, respectively, find the equilibrium price.

11. Suppose a demand and supply equation are, respectively, $5p - q = 10$ and $2p^2 - q = 8$. Find the equilibrium price (there may be more than one)

12. The demand function for a product is $p(q) = 200 - 2q$ where p is the price in dollars per unit when q units are demanded. Find the level of production that maximizes the manufacturer's revenue.

13. A manufacturer sells all units produced. What is the break-even point if the product is sold at \$16 per unit, fixed cost is \$10,000, and variable cost is $y_{vc} = 8q$, where q is the number of units produced.

14. A manufacturer sells a product at \$8.35 per unit, selling all produced. The fixed cost is \$2,116 and the variable cost is \$7.20 per unit. At what level of production will the break-even point occur?

15. Suppose you invest \$250 at 4% interest, compounded monthly. How much money will you have after 3 years? How much would you have if there was no compounding at all?

16. Suppose you want to invest \$5,000 at 5% interest for 10 years. Bank A offers quarterly compounding, Bank A compounds weekly. Where would you invest your money and how much money would the difference be between bank A and B after 10 years?

17. Evaluate the following expressions:
   a) $\log_5(125)$ b) $\log_3(\frac{1}{81})$ c) $\log_4(2)$ d) $\log_{\frac{1}{3}}(9)$

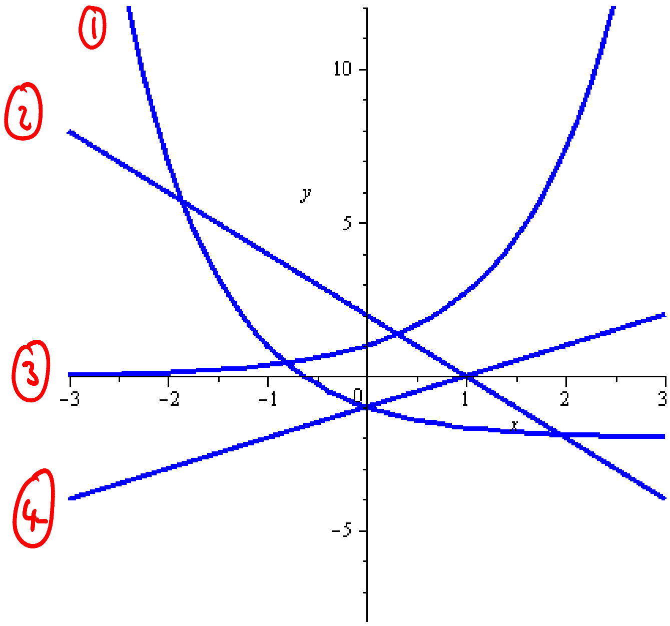
18. Solve for x:
   a) $\log_2(x) = 6$ b) $\log(6x - 2) = 2$ c) $3^{4x} = 9^{x+1}$
   d) $4^{3-x} = \frac{1}{16}$ e) $e^{3x} = 14$

19. The population of a fast-growing town in the south is modeled by the equation $P(t) = 7{,}000\ e^{0.09 \cdot t}$ where *t* is the number of years past 1990.
   a. What was the population of the town in 1990?
   b. What will the population be in 2030?
   c. When, approximately, will the population double in size?

20. A radioactive substance decays according to $N(t) = 10\, e^{-0.14t}$ where N is the number of mg present after t hours. How much of the substance s initially present? How much is present after 5 hours? After how many hours is 0.1 mg remaining?

21. If I invest $2,500 at 6.5% interest, compounded monthly, for how many years should I invest it to reach my goal of having $20,000?

22. Consider the following graphs of functions. Which graph belongs to which function?



a. $f(x) = e^{x}$

b. $g(x) = x - 1$

c. $h(x) = 3^{-x} - 1$

d. $k(x) = 2 - 2x$

Also know the graphs of the logarithm functions!