

Math 1303: Practice Exam 1

This practice exam has many more questions than 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 $f(-2)$, $f(3t)$, and $\frac{f(x+h) - f(x)}{h}$ (simplify your answer). Do the same for the function $f(x) = -3x + 6$.

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

a. Find $h(-2)$ and $g(-2)$

b. Find $h(0)$ and $g(1)$

c. Graph the functions in two separate coordinate systems.

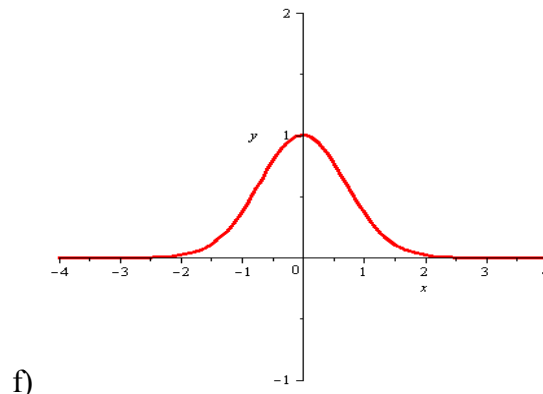
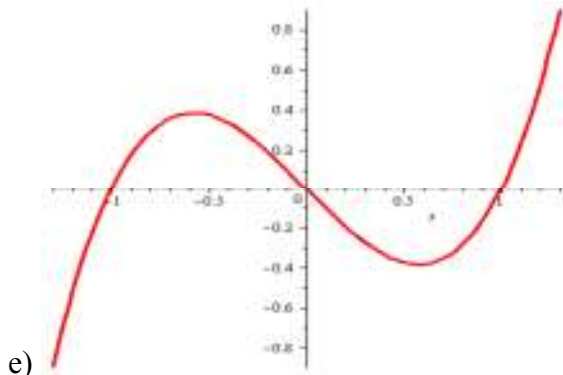
5. Decide whether the following functions are even, odd, or neither:

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) $k(x) = 3x e^{x^2}$



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

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

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

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

$$\begin{aligned} x + y + z &= 0 \\ x - y + z &= 1 \\ -x + y - z &= 2 \end{aligned}$$

9. A company makes 3 types of furniture: chairs, rockers, and chaise lounges. Each require wood, plastic, and aluminum in the quantities shown in the table below. The company stocks 8 units of wood, 10 units of plastic, and 12 units of aluminum. How many chairs, rockers, and chaise lounges should the company produce, assuming they use all of their inventory?

	Wood	Plastic	Aluminum
Chair	1 unit	1 unit	2 units
Rocker	1 unit	1 unit	1 unit
Chaise Lounge	1 unit	2 units	2 units

Hint: If x is the number of chairs, y the number of rockers, and z the number of chaise lounges, then this situation can be modeled by the system of equations:

$$\begin{aligned} x + y + z &= 8 \\ x + y + 2z &= 10 \\ 2x + y + 2z &= 12 \end{aligned}$$

10. Suppose a profit function is given $p(q) = 200q$ while the cost function is $C(q) = 250 + 100q$. Find the fixed cost and the break-even point(s).
11. If the supply and demand functions of a product are $120p - q - 240 = 0$ and $100p - q = 1200$, respectively, find the equilibrium price.
12. 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)
13. 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.
14. 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.
15. 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?
16. 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?

