

## 22M:9

### Practice test for MIDTERM 1

1. Find an equation for the line which is parallel to the line  $2y + x = 3$  and contains the point  $(1, 2)$ .
2. Find the standard form of the equation for the circle with end points of a diameter at  $(1, 4)$  and  $(-3, 2)$ .
3. Let  $f(x) = \sqrt{x}$  and  $g(x) = 3x - 5$ . Find the domains of  $f$ ,  $g$ ,  $f + g$ ,  $f/g$ , and  $g/f$ .
4. Plot the graph of the function  $f(x) = \begin{cases} 1/x & \text{if } x < 0 \\ \sqrt[3]{x} & \text{if } x \geq 0 \end{cases}$ . List its domain, range and all  $x$ -intercept(s) and  $y$ -intercept(s). Identify which is which, and state none if there is not one.
5. Suppose that a company has just purchased a new computer for \$3000. The company chooses to depreciate the computer using the straight line method over 5 years.
  - a. Write a linear function that expresses the book value  $V$  of the computer as a function of its age  $x$  (in years).
  - b. Graph the linear function.
  - c. What is the book value of the computer after 2 years? After 6 years?
  - d. When will the computer have book value \$1800?
6. The price  $p$  (in dollars) and the quantity  $x$  sold of a certain product obey the demand equation
$$x = -5p + 100, \quad 0 \leq p \leq 20$$
  - a. Express the revenue  $R$  as a function of  $x$ .
  - b. What is the revenue if 15 units are sold?
  - c. What quantity maximizes revenue? What is the maximum revenue?
  - d. What price should the company charge to maximize revenue?
7. Let  $f(x) = -x^2 + 3$  and  $g(x) = -3x + 3$ .
  - a. Solve  $f(x) > 0$ .
  - b. Solve  $f(x) > g(x)$ .

- 8.** For the polynomial function  $f(x) = -4x^2(x + 2)$  :
- Find the  $x$ -intercepts,  $y$ -intercepts,
  - Determine whether the graph of  $f$  crosses or touches the  $x$ -axis at each  $x$ -intercept,
  - Determine the behavior of the graph near each  $x$ -intercept,
  - Describe the end behavior: find the power function that the graph of  $f$  resembles for large values of  $|x|$ ,
  - Determine the maximum number of turning points,
  - Plot the graph of  $f$ .
- 9.** Plot the graph of the rational function  $f(x) = \frac{-2}{x+1}$  by using transformations (shift, stretch, flip, etc.).
- 10.** For the rational function  $f(x) = \frac{3}{x^2-4}$  :
- Find the domain,
  - Find all vertical asymptotes,
  - Find all horizontal asymptotes,
  - Find all intercepts,
  - Do the sign analysis for  $f$ , that is find where the graph of lies above  $x$ -axis, and where it lies below the  $x$ -axis,
  - Plot the graph of  $f(x)$ .