Math 160 Exam #1 Review Sheet

Please Note: The exam will cover Chapter 2, Chapter 3, and Section 4.1. The review sheet is designed for you to have a guide as to what to study. The problems on the exam are not limited to the type of problems on this sheet. Any types of problem from the assigned homework problems are possible exam questions. Please attempt other practice problems other than those presented on this sheet in order to be completely prepared for the exam.

1. Determine the domain of the following functions.

a. $f(x)=\dfrac{2x}{x^2-16}$

b. $g(x)=\sqrt{3x-5}$

c. $f(x)=\dfrac{x-2}{x^3-x}$

d. $g(x)=\dfrac{x}{\sqrt{x-6}}$

2. Given $f(x)=\sqrt{4x+1}$, $g(x)=x^2-1$, $h(x)=\dfrac{3}{x-4}$ and $k(x)=3x-5$. Determine the following.

a. $(f+g)(x)$

b. $(g+k)(x)$

c. $(g\cdot h)(x)$

d. $\left(\dfrac{g}{k}\right)(x)$

e. Domain $(f+h)$

f. Domain $\left(\dfrac{h}{g}\right)$

3. Find the average rate of change of :

a. $f(x)=x^2-2x$ from $x=1$ to $x=3$.

b. $f(x)=\dfrac{2}{x+1}$ from $x=2$ to $x=5$.

4. Find the difference quotient of $f(x)=3x^2-4x+5$.

5. Find the equation of the secant line of $f(x)=2x^2-3x+6$ from $x=1$ to $x=3$.

6. Graph the following functions. Describe any transformations, stretches, compressions and reflections.

a. $f(x)=2(x-4)^2+1$

b. $f(x)=\sqrt{x+3}-4$

c. $f(x)=\dfrac{1}{x-3}+2$

d. $f(x)=[\![x]\!]$

e. $f(x)=|x+5|-2$

f. $f(x)=-\dfrac{1}{2}(x-2)^3+2$

7. Graph each of the following quadratic functions. Determine the vertex, axis of symmetry, and intercepts, if they exist.

a. $f(x)=x^2-6x+9$
b. $f(x)=2x^2-x+2$
c. $f(x)=2x^2+5x+3$

8. Find a polynomial with the following zeros.

a. $x=3,\ x=5,\ x=-2$
b. $x=3,\ x=-1$ multiplicity 2

9. Graph the following functions. For each function: *(i)* Find the *x*-intercept(s), *(ii)* Find the *y*-intercept, *(iii)* End behavior: find the power function that the graph of *f* resembles for large values of $|x|$, *(iv)* Determine whether the graph crosses or touches the *x*-axis at each *x*-intercept, *(v)* Determine the maximum number of turning points, *(vi)* Use the *x*-intercept(s) to find the intervals on which the graph of *f* is above or below the *x*-axis,.

a. $f(x) = -3(x-7)(x+3)^2$

b. $f(x) = \left(x - \frac{1}{3}\right)^2 (x-1)^3$

c. $f(x) = x^2(x-3)(x+1)$

10. Suppose the manufacturer of a gas clothes dryer has found that, when the unit price is *p* dollars, the revenue *R* (in dollars) is $R(p) = -4p^2 + 4000p$. What unit price should be established for the dryer to maximize revenue? What is the maximum revenue?

11. The price *p* and the quantity *x* sold of a certain product obey the demand equation $x = -5p + 100,\ 0 \le p \le 20$. Express the revenue *R* as a function of *x*. What is the revenue if 15 units are sold? What quantity *x* maximizes revenue? What is the maximum revenue? What price should the company charge to maximize revenue?

12. David has available 400 yards of fencing and wished to enclose a rectangular area. Express the area *A* of the rectangle as a function of the width *x* of the rectangle. For what value of *x* is the area largest? What is the maximum area?

13. A farmer with 4000 meters of fencing wants to enclose a rectangular plot that borders on a river. If the farmer does not fence the side along the river, what is the largest area that can be enclosed?

14. A track and field playing area is in the shape of a rectangle with semicircle at each end. The inside perimeter of the track is to be 1500 meters. What should the dimensions of the rectangle be so that the area of the rectangle is a maximum?