REVIEW TEST 2 - Chapters 4, 5, 6 and 7

Test 2 on Wednesday, April 29

To prepare for the test, you should study the following:

Chapter 4

- All exercises done in class
- All homework problems

- More practice:

1) Solve the following inequalities; graph the solution set; write the solution set in interval notation.

a) $-\frac{2}{3}(2x+\frac{3}{2})\geq 14$; b) $-\frac{2}{5}<\frac{x-4}{3}\leq 4$; c) $\frac{1}{2}x-3>2x+3(x-\frac{1}{3})$;

d) $2(x+2)\geq\frac{1}{5}+2x$ e) $\frac{2x+3}{3}+\frac{3x-4}{2}>\frac{x-2}{2}$

2) Solve the following:

a) $\left|3x+\frac{1}{2}\right|=\frac{5}{3}$, b) $\left|x-\frac{1}{4}\right|=|x+2|$, c) $\left|2x+\frac{4}{7}\right|+1=2$, d) $|2x+1|<-2$; i) $3|2x+5|>9$

e) $\left|\frac{3}{5}x-2\right|-\frac{1}{2}\geq 4+\frac{1}{2}$, f) $|x-1|+4\leq 11$, g) $|x|+7\geq 7$, h) $-|3x+2|-\frac{1}{2}>2$, J) $\left|\frac{x+1}{x+8}\right|=\frac{2}{3}$

3) For what values of k does $|x|+k=0$ have:

a) exactly one solution; b) exactly two solutions; c) no solution. Provide an example for each case.

4) Maria is investing in the hotel business. She has bought two hotels and will expand her investment when her total profit from the two hotels is at least $10,000.

a) Write an inequality to model the problem.

b) Graph the solutions set.

c) What does (-1000, 12,000) mean in the context of the problem?

d) What does (5000, 4000) mean in the context of the problem?

Answers (1) a) $x\leq-\frac{45}{4}$; b) $\frac{14}{5}<x\leq 16$; d) $x\in\mathbb{R}$; e) $x>0$; (2) a) $x\in\left\{\frac{7}{18},\frac{-13}{18}\right\}$; b) $x=-\frac{7}{8}$; c) $x\in\left\{\frac{3}{14},-\frac{11}{14}\right\}$; d) $x\in\varnothing$; e) $x\geq\frac{35}{3}$ or $x\leq-5$; f) $-6\leq x\leq 8$; g) $x\in\mathbb{R}$; h) $x\in\varnothing$; i) $x>-1$ or $x<-4$.

Chapter 5

- Chapter 5 Handout – all exercises and applications
- All exercises done in class
- All homework problems
- Quiz 2

Chapter 6

- All exercises done in class
- Chapter 6 Handout – all exercises (see solutions on the website)
- All homework problems

Chapter 7

- All exercises done in class
- All homework problems

- More practice

1. Simplify the following expressions. The final answer should have only positive exponents.

a) $\dfrac{6^{\frac{5}{6}}}{6^{\frac{1}{2}}}+6^{\frac{1}{3}}\left(6^{-\frac{1}{2}}\right)$ b) $\left(\dfrac{2x^{-4}y}{x^5y^5}\right)^{-3}\left(\dfrac{4x^{-2}y^0}{x^7y^2}\right)^2$ c) $\dfrac{\left(-2x^{\frac{3}{2}}y^{\frac{1}{3}}\right)^2\left(3x^{\frac{1}{2}}y^5\right)^{\frac{1}{3}}}{\left(2x^2\right)^3(3y)}$ d) $\left(\dfrac{2x^{-\frac{1}{2}}y}{x^{\frac{5}{2}}y^{-\frac{1}{3}}}\right)^{-\frac{2}{3}}$ e) $\left(\dfrac{x^{\frac{-5}{4}}y^{\frac{1}{3}}}{x^{-\frac{3}{4}}}\right)^{-6}$

2. Write each expression in simplest form:

a) $\sqrt{18u^3v^8}+3v\sqrt{30u^5}$ b) $2\sqrt{75}+4\sqrt{12}-\left(2\sqrt{2}-\sqrt{3}\right)\left(2\sqrt{2}+\sqrt{3}\right)$ c) $\left(3\sqrt{5}-4\right)^2+2\sqrt{45}(5-\sqrt{5})$

d) $-(3+2x)i-2(2x-3i)^2$ e) $2\sqrt[3]{x^4y^2}+2x\sqrt[3]{xy^2}$

3. Simplify:

a) $\dfrac{9-\sqrt{-72}}{12}$ b) $\dfrac{2+\sqrt{-8}}{2}$ c) $\dfrac{-4+\sqrt{-28}}{6}$

4. Let $f(x)=x^2-2x+2$. Find $f(1+i),\ f(2i), f(1-3i)$.

5. If $g(x)=x^2-6x-4$, find $g\left(\sqrt{a+1}-\sqrt{a-1}\right)$ and $g\left(3-\sqrt{13}\right)$.

6. Let $f(x)=x^2$. Find $f\left(\sqrt{a+1}-\sqrt{a-1}\right)$ and $f\left(1-2\sqrt{3}\right)$.

7. Find the lengths if all sides of a right triangle whose legs are $\sqrt{x-7}$ and $\sqrt{x}$, respectively, and whose hypotenuse is $1+\sqrt{x}$.

8. $f(x)=\sqrt{x+16}-\sqrt{x}-2$ and $g(x)=\sqrt{2x-3}-\sqrt{2x}+1$

a) Find the domain of each function.

b) Find the *x*-intercepts of the graph of each function without graphing the function

9. Find the domain and sketch the graph of each function. Find the range of each function.

a) $f(x)=\sqrt{x+1}$ b) $g(x)=\sqrt{3-x}$ c) $h(x)=\sqrt{x}+2$

10. Find the perimeter and area of a rectangle whose dimensions are given. Simplify as much as possible. Use correct units.

a) width $2\sqrt{20}$ and length $\sqrt{125}$

b) width $\sqrt{80}$ and length $4\sqrt{20}$ (textbook # 83. 84 page 518)

11. The total cost C for a producer to manufacture n units of a good is given by $C(n)=5000+50n$.

Define the average cost $A(n)$, for producing *n* units by the equation $A(n)=\dfrac{C(n)}{n}$.

a) Evaluate and interpret the economic significance of:

i) $C(1)$ ii) $C(100)$ iii) $C(1000)$ iv) $C(10{,}000)$

b) Evaluate and interpret the economic significance of:

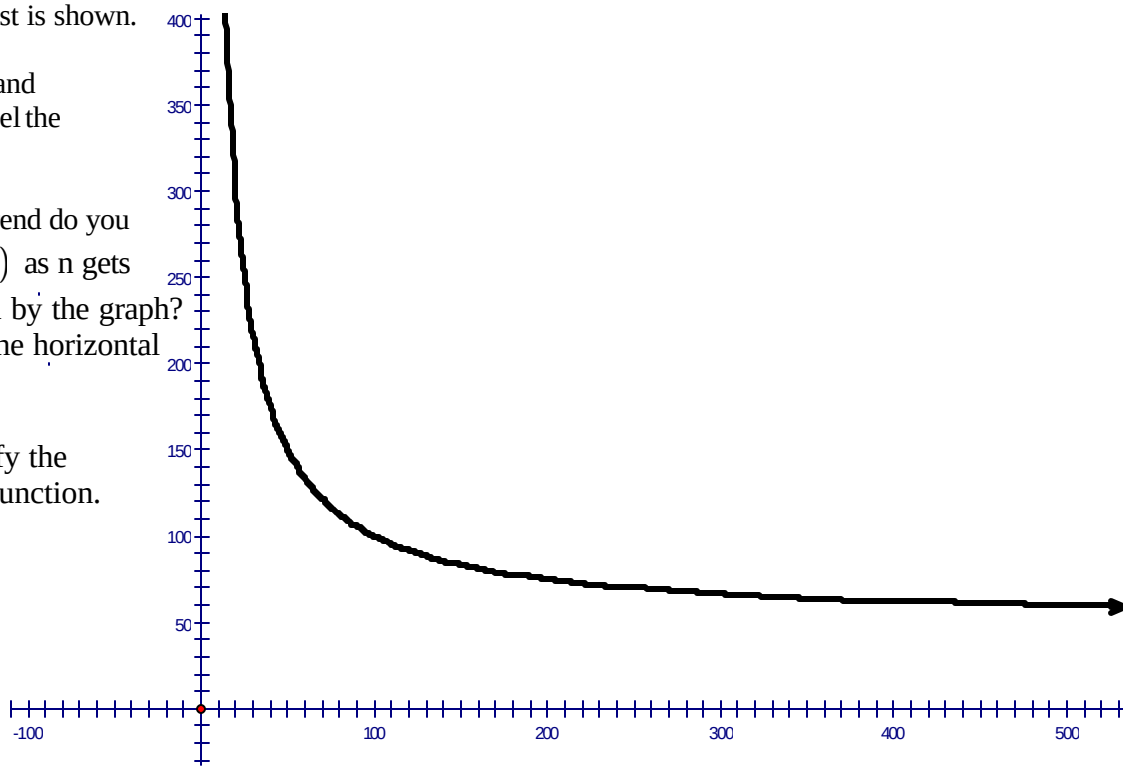
i) $A(1)$ ii) $A(100)$ iii) $A(1000)$ iv) $A(10{,}000)$

The graph of the average cost is shown.

c) Identify the independent and dependent variables and label the axes accordingly.

d) Based on part (b), what trend do you notice in the values of $A(n)$ as n gets larger? How is this shown by the graph? What is the equation of the horizontal asymptote of the graph?

e) Using the graph, identify the domain and range of the function.



12. Police use the function $f(x) = \sqrt{20x}$ to estimate the speed of a car, f(x), in miles per hour, based on the length, x, in feet, of its skid marks upon sudden braking on a dry asphalt road. A motorist is involved in an accident. A police officer measures the car's skid mark to be 45 feet long. Estimate the speed at which the motorist was traveling before braking. If the posted speed limit is 35 miles per hour and the motorist tells the officer she was not speeding, should the officer believe her? Explain.

13. Deer are placed into a newly acquired habitat. The deer population over time is modeled by a rational function whose graph is shown in the figure. Use the graph to answer each of the following questions:
a) How many deer were introduced into the habitat?
b) What is the population after 25 years?
c) What is the equation of the horizontal asymptote shown in the figure? What does this mean in terms of the deer population?