Math Pre-Calc 20 Final Review

Chp1 Sequences and Series

#1. Write the first 4 terms of each sequence:

a) $t_1 = 3 \quad d = -2$ b) $t_n = 3^n$

#2. Find the value of the term indicated:

a) 1, 3, 9, … , t_7 b) 17, 13, 9, … , t_{25}

#3. Find the number of terms in each sequence:

a) $\frac{1}{2}, \frac{7}{8}, \frac{5}{4}, ..., \frac{31}{2}$ b) -5, -10, -20, … , -10240

#4. Write the general term (t_n) for each sequence:

a) -8, 4, -2, … b) -5, -10, -15, …

#5. The 20th term of an arithmetic sequence is 12 and the 32nd term is 48. Find the first term and the common difference.

#6. Write out the first three terms of the geometric sequence whose fifth term is 48 and whose seventh term is 192.

#7. Find the sum of each series:

a) 100 + 90 + 80 + … + -200 b) 3 + 6 + 12 + … + S_9

#8. Find the sum of the infinite geometric series:

a) $2+1+\frac{1}{2}+...$ b) $4+\frac{20}{3}+\frac{100}{9}...$

#9. Suppose that each year a tree grow 90% as much as it did the year before. If the tree was 2.35 m tall after the 1st year, how tall would it eventually get?

#10. A man walks 5km in week1, 8 km in week2, 11 km in week3 and so forth. How many km would he walk in total over 10 weeks?

Chp2 Trig

#1. Sketch the angle and name its reference angle: 242°

#2. Find the exact value of the following without using a calculator:

a) Cos 210° b) Sin 315°

#3. A point P(4,-3) lies on the terminal arm of an angle Θ in standard position. Determine the exact trigonometric ratios for Sin Θ, Cos Θ and Tan Θ.

#4. If Sin Θ = $\frac{5}{13}$, Θ is in Q2, find the Cos Θ and Tan Θ.

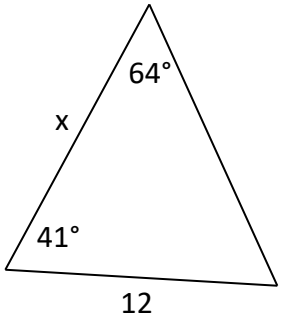
#5. Find the quadrant where Cos Θ < 0 and Tan Θ > 0.

#6. Solve for Θ if 0° ≤ Θ ≤ 360°.

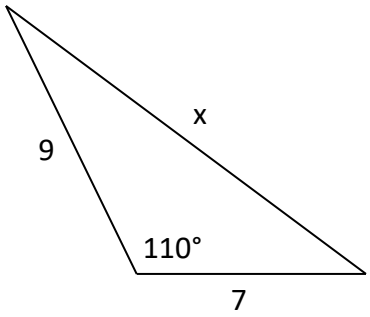
Sin Θ = $-\frac{\sqrt{3}}{2}$

#7. Find each measure indicated:

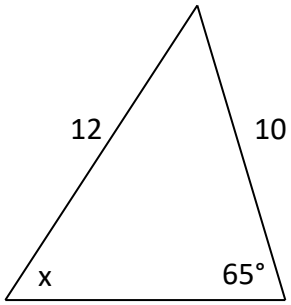
a)



b)



c)



#8. Solve each triangle ΔABC.

a) B = 27°, A = 112°, b = 5 b) a = 6, b = 7, c = 8

#9. Determine how many ABC triangles satisfy the following conditions.

a) $\angle$A = 65°, a = 9.1 cm, and b = 10.7 cm

b) $\angle$A = 24°, a = 5, and b = 7

#10. Two boats leave a dock at the same time. Each travels in a different direction. The angle between their courses is 54°. If one boat travels 80 km and the other travels 100 km, how far apart are they?

Chp 3 Quadratic Functions

#1. Find the vertex of each quadratic:

a) $y = 3x^2$ b) $y + 3 = -\frac{1}{2}x^2$ c) $y = (x + 1)^2 + 2$

#2. Write each of the following in vertex-graphing form by completing the square:

a) $y = x^2 + 4x$ b) $y = x^2 + x - 1$ c) $y = -3x^2 + 12x - 2$

#3. Answer the following questions for each quadratic function:
a) vertex b) equation of the axis of symmetry c) concavity (faces up or down)
d) maximum or minimum value e) domain and range f) x and y intercepts
g) sketch the graph

i) $y = -3(x + 2)^2 + 3$ ii) $y = x^2 + 4x + 3$

#4. Write a quadratic equation in vertex graphing form for each of the following:

a) a = 2 vertex is (-1, 2) b) vertex is (3, 2) and passes through the point (2, -1)

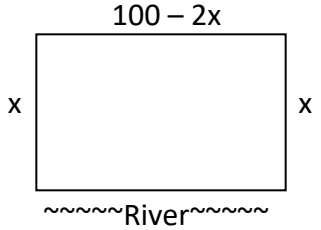
#5. Write the new equation of the parabola $y = x^2$ after the following: (3 marks)

a) a horizontal translation 2 units to the left and a vertical translation 1 unit up
b) a vertical translation 3 units down and a reflection across the x-axis
c) a multiplication of the y-values by -2 and then a horizontal translation 1 unit to the right

#6. A bridge has the shape of a parabola. Its width is 50m and its height is 12m. Find the quadratic equation for this bridge.

#7. The height, "h", in metres, of a flare "t" seconds after it is fired into the air is given by the equation $h(t)=-4.9t^2 + 61.25t$. At what height is the flare at its maximum height? How many seconds after being shot does this occur?

#8. A farmer has 100m of fencing material to enclose a rectangular field adjacent to a river. No fencing is required along the river. Find the dimensions of the rectangle that will make its area a maximum. What is the maximum Area? (Hint: a diagram of the situation is given below)



Chp 4 Quadratic Equations

#1. Solve the quadratic equations by factoring:

a) $3x^2 - 36x = 0$ b) $2x^2 - 7x - 15 = 0$ c) $6x^2 - 11x + 3 = 24$

#2. Solve the quadratic equations by completing the square: (Write answers in Exact Form)

a) $x^2 - 6x + 5 = 0$ b) $x^2 + 4x + 1 = 0$ c) $3x^2 - x - 2 = 0$

#3. Solve the quadratic equations using the quadratic formula: (Write answers in Exact Form)

a) $x^2 + 4x - 96 = 0$ b) $3x^2 = 4$ (Hint: Same as $3x^2 - 0x - 4 = 0$)

#4. Find the zeros of the function $f(x) = x^2 - 10x + 16$.

#5. Find the quadratic equation with the roots of $\left\{\frac{1}{2}, -\frac{2}{3}\right\}$

#6. Find the discriminant and state the nature of the roots:

a) $x^2 - 4x - 5 = 0$ b) $x^2 = -9$ c) $x^2 + 2x + 1 = 0$

#7. The hypotenuse of a right triangle is 13. If the sum of the legs is 17, find the legs.
(Hint: Let one leg be x and the other is therefore 17-x…since the sum is 17.)

#8. If $h(t) = 5t^2 - 30t + 45$, find t when h = 20. (Hint: $20 = 5t^2 - 30t + 45$)

Chp 5 Radicals

Squares	Cubes	Fourths
4	8	16
9	27	64
16	64	81
25	125	625
36	216	x^4
49	x^3	x^8
64	x^6	
81		
100		
x^2		
x^4		

#1. Simplify:

a) $\sqrt{150}$ b) $\sqrt[3]{32x^5}$ c) $\sqrt[4]{32x^9y^6}$

#2. Change each mixed radical into an entire radical:

a) $4\sqrt{3}$ b) $2x\sqrt[3]{3x^2}$

#3. Simplify:

a) $5\sqrt{2}-6\sqrt{3}+7\sqrt{2}-\sqrt{3}$ b) $\sqrt{108}-2\sqrt{27}-\sqrt{40}-5\sqrt{160}$

c) $3\sqrt[3]{54}+2\sqrt[3]{128}$

#4. Multiply (Expand) the following and simplify:

a) $\left(\sqrt{6}\right)\left(\sqrt{2}\right)$ b) $\left(3\sqrt{2x}\right)^2$ c) $\left(\sqrt[3]{4x^2}\right)^2$

d) $\left(2x\sqrt{3y}\right)\left(3x\sqrt{6y^3}\right)$ e) $3\sqrt{2}\left(\sqrt{2}+\sqrt{3}\right)$ f) $\left(3\sqrt{2}-2\sqrt{5}\right)^2$

g) $\left(2+\sqrt{x}\right)\left(3-\sqrt{x}\right)$

#5. Divide the following and be sure to rationalize all denominators:

a) $\frac{3\sqrt{6}}{6\sqrt{2}}$ b) $\frac{\sqrt{2}}{\sqrt{10}}$ c) $\frac{3\sqrt{2}}{2\sqrt{3}}$ d) $\frac{3x}{\sqrt{2x}}$

e) $\frac{3\sqrt{3}-\sqrt{2}}{2\sqrt{2}}$ f) $\frac{\sqrt{5}+\sqrt{3}}{\sqrt{5}-\sqrt{3}}$ g) $\frac{2}{\sqrt[3]{9}}$

#6. Solve the radical equations:

a) $\sqrt{3x-2}=7$ b) $6-2\sqrt{x+7}=-2$ c) $\sqrt{2x+5}=x-5$

d) $\sqrt{x^2+4}=3$ e) $\sqrt{y-5}+\sqrt{y}=5$

Chp 6 Rationals

#1. Simplify:

a) $\frac{12x^2y^2}{15xy^3}$ b) $\frac{16x^2-25}{12x-15}$ c) $\frac{3x-6}{2x^2+x-10}$

#2. Multiply/Divide the following and simplify:

a) $\frac{12m^2f}{5cf}\cdot\frac{15c}{4m}$ b) $\frac{a^2-16}{16a-4a^2}\cdot\frac{2a^3+6a^2}{a^2+7a+12}$

c) $\frac{8y^2-2y-3}{y^2-1}\div\frac{2y^2-3y-2}{2y-2}\div\frac{3-4y}{y+1}$

#3. Add/Subtract the following and simplify:

a) $\frac{3}{m}+\frac{2}{n}-\frac{3}{c}$ b) $\frac{a-5}{2}-\frac{a-2}{3}$ c) $\frac{y^2-20}{y^2-4}-\frac{y-2}{y+2}$

d) $\frac{5}{x^2-5x+6}-\frac{4}{x^2-x-6}$ e) $\frac{1+\frac{1}{x}}{x-\frac{1}{x}}$

#4. Solve each rational equation and list all the restrictions:

a) $\frac{x-2}{2}=\frac{2x+4}{5}-1$ b) $\frac{12}{x}-1=\frac{9}{x}$

c) $\frac{x}{x-2}=\frac{x-6}{x-4}$ d) $\frac{d}{d+4}=\frac{2-d}{d^2+3d-4}+\frac{1}{d-1}$

#5. The sum of two numbers is 12. The sum of their reciprocals is $\frac{4}{9}$. Find the numbers.

#6. Two hoses are used to fill up a pool. If one hose fills the pool in 6 hrs and the other fills the pool in 12 hrs, how much time would it take the fill the pool using both hoses?

Chp 7 Absolute Value and Reciprocal Functions

#1. Evaluate:

a) $|-3|$ b) $-2|-6|$ c) $3|-2|-4|-2|$ d) $|2-6-3|-|5-4+3(2)|$

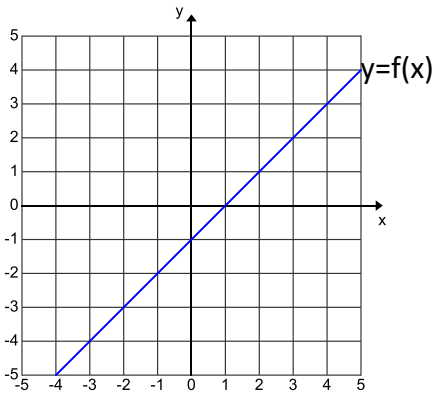
#2. Solve each equation:

a) $|3x|=9$ b) $5|4x|+10=5$ c) $|4x+3|=7$

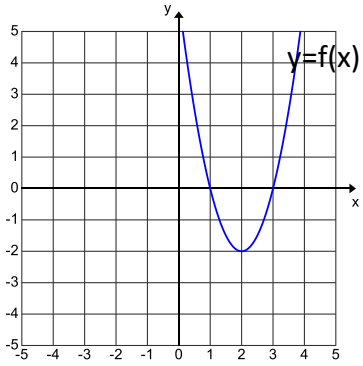
d) $|3x+3|=2x-5$ e) $|x^2-2x+2|=3x-4$

#3. Use the graph of y=f(x) to sketch the graph of y=|f(x)|

a)



b)



#4. Sketch the graph of:

a) y = |x – 3| b) y = |-x² + 4|

#5. Express y = |x – 3| as a piecewise function.

#6. Sketch the graph of y = x + 1 and $y=\frac{1}{x+1}$. State the invariant points.

#7. Sketch the graph of y = x² – x – 6 and $y=\frac{1}{x^2-x-6}$. State the invariant points.

Chp 8 Systems

#1. Solve by graphing. Give approximate solutions if needed. Verify your solutions.

$y = \frac{1}{2}x+2$
$y + x^2 + 2x = 8$

#2. Solve algebraically. Verify your solutions.

$y = 3x + 1$
$y = 6x^2 + 10x – 4$

#3. Solve algebraically. Verify your solutions.

$x^2 + y – 3 = 0$
$x^2 – y + 1 = 0$

#4. Solve algebraically. Verify your solutions.

$y = x^2 – 4x + 1$
$2y = -x^2 + 4x + 2$

Chp 9 Quadratic Inequalities

#1. Solve by graphing:

a) $y < \frac{2}{3}x + 1$

b) $3x – 2y \geq 6$

#2. Solve:

a) $x^2 + x – 12 < 0$

b) $x^2 > 5x$

c) $x^2 – 3x + 6 < 2x$

d) $2x^2 < 3 – 5x$

#3. Solve by graphing:

a) $y < (x – 2)^2 – 1$

b) $y + 3 \geq x^2 – 2x$