ALGEBRA 3/TRIGONOMETRY
Midterm Exam Review

A. Solve for x:

1. $4x^2 + x - 3 = 0$
2. $x^2 - 6x + 8 = 0$
3. $x^2 - 6x - 8 = 0$
4. $x^4 - 13x^2 + 36 = 0$
5. $x^4 - 15x^2 - 16 = 0$
6. $-3x + 7 < 5$
7. $-5x - 10 \leq 15$
8. $|5x - 3| > 12$
9. $\frac{5}{x-3} - \frac{2}{2x-6} = 1 + \frac{2}{x}$
10. $\frac{3x-5}{16} - \frac{2x+3}{8} = 1 + \frac{7x-9}{4}$
11. $x^4 - 6x^2 - 8x + 24 = 0$
12. $x^4 - 2x^3 - 10x^2 + 18x + 9 = 0$
13. $|x-3| + |2x+3| > 12$

B. Simplify the following expressions:

1. $\sqrt{576x^8y^9}$
2. $\sqrt[3]{576x^8y^9}$
3. $\sqrt[4]{576x^8y^9}$
4. $\frac{2-4i}{1+3i}$
5. $\frac{3+\sqrt{7}}{3-\sqrt{7}}$
6. $\frac{(2x^5y^{-9})(-y^3x^4)^2}{(x^2y^{17})^4}$
7. $\sqrt[3]{\frac{81x^2y^5z^{13}}{4m^7}}$
8. $\sqrt{\frac{2}{3}} + \sqrt{24} - \sqrt{\frac{3}{2}}$
9. i^{243}

C. Factor the following completely.

1. $x^2 - 4x + 4 - 9y^2$
2. $24x^2 + 55x - 24$
3. $2x^5 + 5x^4 - 8x - 20$
4. $36x^3 - 24x^2 - 45x$
5. $3x^5 + x^4 - 48x - 16$
6. $x^6 - 9x^3 + 8$

D. Solve for x and y using any method.

1. $3x - 5y = -13$
   $4x + 3y = 2$
2. $7x - 2y = 29$
   $2x + 5y = 25$
3. $x + y + 2z = 6$
   $3x - 4y - 4z = 0$
   $2x + 3y = 1$

E. Coordinate Geometry

1. Write the equation of the line which is the perpendicular bisector of the segment whose endpoints are (-2, -5) and (4, 1)

2. Write the equation of the line which passes through (-1, 7) and is parallel to $3x + 4y = 17$.

3. Find the equation of the median to $\overline{AB}$ of the triangle A (0, 0) B (6, -4) and C (1, 9)

4. Find the domain of the following:

a) $y = |2x - 4| + 1$ b) $y = \dfrac{x^2 + 4x}{2x + 1}$ c) $y = \sqrt{x^2 - 7x}$

5. Graph the following completely

a) $y = |2x - 4|$ b) $y = x^2 + 4x - 1$ c) $y = \begin{cases} 2x & x > 2 \\ 4 & -2 \le x \le 2 \\ -x + 1 & x < -2 \end{cases}$

d) $y = \dfrac{x - 1}{2x + 1}$ e) $y = \dfrac{x - 1}{(2x + 1)^2}$ g) $y = \dfrac{x^2 - 1}{x}$

F. Divide:

1. $\dfrac{3x^5 + 2x^3 - 5x^2 + 3}{x^2 - 2x + 2}$

G. Word Problems

1. George bought 7 quarts of cleaning fluid; x quarts at $3 per quart and y quarts at $2 per quart. Find how much of each he bought if the total cost was $16.

2. The perimeter of a rectangle is 86 cm. Twice the width exceeds the length by 2 cm. Find the dimensions of the rectangle.

4. The sum of the squares of 2 consecutive even integers is 244. Find the integers.

5. Find two consecutive integers whose product is 552.

6. The difference of the squares of 2 consecutive odd integers is 48. Find the integers.

7. A rectangular garden 25' by 50' is increased on ALL sides by the same amount. Its area increases 400 square feet. By how much is each dimension increased?

Answers

Section A

1. $x = \frac{3}{4}, -1$
2. $x = 4, 2$
3. $x = 3 \pm \sqrt{17}$
4. $x = \pm 2, \pm 3$
5. $x = \pm 4, \pm i$
6. $x > \frac{2}{3}$
7. $x \geq -5$
8. $x > 3$ or $x < \frac{-9}{5}$
9. $x = 6, -1$
10. $x = \frac{9}{29}$
11. $x = 2, 2, -2 \pm i\sqrt{2}$
12. $x = \pm 3,\ 1 \pm \sqrt{2}$
13. $x > 4$ or $x < -4$

Section B

1. $24x^4y^4\sqrt{y}$
2. $4x^2y^3\sqrt[3]{9x^2}$
3. $2x^2y^2\sqrt[4]{36y}$
4. $-1 - i$
5. $8 + 3\sqrt{7}$
6. $\frac{2x^5}{y^{71}}$
7. $\frac{3yz^4\sqrt[3]{6x^2y^2zm^2}}{2m^3}$
8. $\frac{11\sqrt{6}}{6}$
9. $-i$

Section C

1. $(x - 2 + 3y)(x - 2 - 3y)$
2. $(8x - 3)(3x + 8)$
3. $(2x + 5)(x^2 + 2)(x^2 - 2)$
4. $3x(6x + 5)(2x - 3)$
5. $(3x + 1)(x^2 + 4)(x + 2)(x - 2)$
6. $(x - 2)(x^2 + 2x + 4)(x - 1)(x^2 + x + 1)$

Section D

1. $(-1, 2)$
2. $(5, 3)$
3. $\left(2,\ -1,\ \frac{5}{2}\right)$

Section E

1. $y = -x - 1$
2. $y = -\frac{3}{4}x + \frac{25}{4}$ or $3x + 4y = 25$
3. $y = -\frac{11}{2}x + \frac{29}{2}$
4. a) all reals
   b) $x \neq -\frac{1}{2}$
   c) $x \geq 7$ or $x \leq 0$
5. Graphs will be done in class

Section F

1. $3x^3 + 6x^2 + 8x - 1 + \frac{-18x + 5}{x^2 - 2x + 2}$

Section G

1. x = 2, y = 5
2. 15 cm by 28 cm
3.
4. 10, 12 or -12, -10
5. 23, 24 or -24, -23
6. 13, 11
7. $2\frac{1}{2}$' on each side.