MATH 5071 - Problem Set 3

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Simplifying Rational Expressions

1) Simplify completely: $\frac{xy+3x}{6x^2+xy}$

2) Simplify completely: $\frac{x^2+10x+25}{x^2-25}$

3) Simplify completely: $\frac{2}{5x+10} \cdot \frac{10x+20}{x+1}$

4) Simplify completely: $\frac{x^2}{12x+6} \div \frac{x}{2x+1}$

5) Simplify completely: $\frac{3x-1}{4x+12} \div \frac{4x-4}{x+3}$

6) Simplify completely: $\frac{2x^2+3x-9}{6x^2-7x+1} \cdot \frac{2x^2+3x-5}{x^2+2x-3} \cdot \frac{6x^2+17x-3}{2x^2+7x-15}$

Adding/Subtracting Rational Expressions

7) Add/subtract and simplify completely: $\frac{4}{x} + \frac{7}{4x} + 1$

8) Add/subtract and simplify completely: $\frac{a}{b} + \frac{b}{a}$

9) Add/subtract and simplify completely: $\frac{6}{x+2} - \frac{11}{2x-7}$

10) Add/subtract and simplify completely: $\frac{2x^2+2}{x+1} - \frac{7}{x^2-1}$

11) Add/subtract and simplify completely: $\frac{x-3}{x^2+5x+4} + \frac{2x+1}{x^2+3x+2}$

Simplifying Radical Expressions

12) Evaluate:

i) $\sqrt{9}$

ii) $\sqrt[3]{1}$

iii) $\sqrt[5]{32}$

iv) $\sqrt[3]{27}$

13) Evaluate:

i) $4^{\frac{3}{2}}$

ii) $64^{\frac{2}{3}}$

14) Simplify:

i) $\sqrt{18}$

ii) $\sqrt{72}$

iii) $\sqrt{12x^4}$

iv) $\sqrt{200x^{12}y^7}$

15) Rationalize:

i) $\frac{4}{\sqrt{2}}$

ii) $\frac{3x}{3-\sqrt{5}}$

Adding/Subtracting Radical Expressions

16) Add/subtract: $5\sqrt{2} - 3\sqrt{2}$

17) Add/subtract: $73\sqrt{r^2x} + 33\sqrt{r^2x}$

18) Add/subtract: $9\sqrt{20} + 2\sqrt{45} - 3\sqrt{5}$

Multiplying Radical Expressions

19) Multiply and simplify: $\sqrt{5} \cdot \sqrt{11}$

20) Multiply and simplify: $\sqrt{35x^3} \cdot \sqrt{7x}$

21) Multiply and simplify: $(2 + \sqrt{7})(1 - \sqrt{6})$

22) Multiply and simplify: $(a + \sqrt{b})(a - \sqrt{a})(b + \sqrt{b})$

Complex Numbers

23) Evaluate: $i^5 8$

24) Evaluate:

i) $\sqrt{-9}$

ii) $\sqrt{-72}$

25) Evaluate:

i) $(6 - 2i) + (3 - 5i)$

ii) $(5 + 3i) - (-3i - 8)$

26) Evaluate:

i) $(4 - 2i)(4 + 2i)$

ii) $(3 + 5i)(8 + i)$

27) Evaluate:

i) $\frac{1+i}{1-i}$

ii) $\frac{2+3i}{6+7i}$