MATH 111

Exam 1 review

The following are review exercises for the Math 111 first exam. These exercises are provided for you to practice or test yourself for readiness for the first exam.

1. Given $A = \{x \mid -3 < x \leq 7\}$, $B = \{x \mid x \geq 5\}$, $C = \{x \mid x > 10\}$ find the following and express your answer using interval notation.

   (a) $A \cap B$ (b) $A \cup C$ (c) $A \cap C$

2. Perform the indicated operation and express your answer in simplest form.

   (a) $(8x+4) \div \dfrac{x-3}{2x^2-5x-3}$ (b) $\dfrac{x^2-x-2}{x+3} \cdot \dfrac{3x+9}{2x+2}$ (c) $\dfrac{3}{5x^2y} - \dfrac{2}{3xy^2}$

   (d) $\dfrac{3x}{x^2-9} + \dfrac{5}{2x^3-6x^2}$ (e) $\dfrac{x-2}{3x^2-12x} - \dfrac{3}{x^2-8x+16}$

3. Perform the indicated operation and simplify.

   (a) $\Big(-2x^2y\Big)^2\Big(2xy^3\Big)^3$ (b) $\Big(\dfrac{2x^2y^3}{xy^4}\Big)^2\Big(\dfrac{3xy^2}{6}\Big)^3$ (c) $\Big(\dfrac{2}{5}a^6b^4\Big)\Big(\dfrac{10a^3}{b^4}\Big)$

4. Perform the indicated operation and express your answer in simplest form with positive exponents only.

   (a) $\dfrac{11ac^{-2}}{(abc)^{-1}}$ (b) $\left(\dfrac{15m^3n^{-2}p^{-1}}{25m^{-2}n^{-4}}\right)^{-3}$ (c) $\dfrac{\left(x^{1/2}y^{1/3}\right)^{-2}\left(x^{1/3}y^{1/4}\right)^{-12}}{xy^{1/4}}$

5. Factor completely.

   (a) $6n^2+5n-4$ (b) $y^2+9-6y-4x^2$ (c) $81y^4-256$ (d) $64x^3-125$

   (e) $3y(y-2)^2+(y-2)$ (f) $y^{2/3}-4y^{1/3}+3$ (g) $2x(x^2+1)^{-1/3}+(x^2+1)^{2/3}$

6. Express the following as a simple fraction reduced to lowest terms.

   (a) $\dfrac{\dfrac{3x^2y}{2ab}}{\dfrac{9x}{16a^2}}$ (b) $\dfrac{\dfrac{5}{x+y}}{\dfrac{5}{x-y}}$ (c) $\dfrac{\dfrac{2x^2-3x-2}{x^2-1}}{\dfrac{2x^2+5x+2}{x^2+x-2}}$

7. Evaluate each of the following.

   (a) $8^{-4/3}$ (b) $-243^{-4/5}$

8. Perform the indicated operation and express your answer in simplest radical form.

(a) $\sqrt{12}\sqrt{75}$ (b) $3\sqrt{8}-5\sqrt{32}+2\sqrt{27}$ (c) $\sqrt{12a^3b^9}$ (d) $\sqrt[3]{20ab^5}\sqrt[3]{50b^4}$

(e) $\left(4a\sqrt{10b}\right)\left(3b\sqrt{2a}\right)$ (f) $\dfrac{\sqrt[3]{a^{13}b^2}}{\sqrt[3]{a^4b^5}}$ (g) $2b^2\sqrt{48a^7b^6}-5a\sqrt{27a^5b^{10}}$

9. Rationalize the denominator.

(a) $\dfrac{3x}{\sqrt{4y}}$ (b) $\dfrac{5xy}{\sqrt[3]{x^2y}}$

ANSWERS

1a) $[5, 7]$ 1b) $(-3, 7] \cup (10, \infty)$ 1c) ϕ

2a) $4(2x+1)^2$ 2b) $\dfrac{3(x-2)}{2}$ 2c) $\dfrac{9y-10x}{15x^2y^2}$ 2d) $\dfrac{6x^3+5x+15}{2x^2(x-3)(x+3)}$

2e) $\dfrac{x^2-15x+8}{3x(x-4)^2}$

3a) $32x^7y^{11}$ 3b) $\dfrac{x^5y^4}{2}$ 3c) $4a^9$

4a) $\dfrac{11a^2b}{c}$ 4b) $\dfrac{125p^3}{27m^{15}n^6}$ 4c) $\dfrac{1}{x^6y^{47/12}}$

5a) $(2n-1)(3n+4)$ 5b) $(y-3-2x)(y-3+2x)$ 5c) $(9y^2+16)(3y-4)(3y+4)$

5d) $(4x-5)(16x^2+20x+25)$ 5e) $(y-2)(3y^2-6y+1)$ 5f) $(y^{1/3}-3)(y^{1/3}-1)$

5g) $(x^2+1)^{-1/3}(x+1)^2$

6a) $\dfrac{8axy}{3b}$ 6b) $\dfrac{x-y}{x+y}$ 6c) $\dfrac{x-2}{x+1}$

7a) $\dfrac{1}{16}$ 7b) $-\dfrac{1}{81}$

8a) 30 8b) $-14\sqrt{2}+6\sqrt{3}$ 8c) $2ab^4\sqrt{3ab}$ 8d) $10b^3\sqrt[3]{a}$

8e) $24ab\sqrt{5ab}$ 8f) $\dfrac{a^3}{b}$ 8g) $-7a^3b^5\sqrt{3a}$

9a) $\dfrac{3x\sqrt{y}}{2y}$ 9b) $5\sqrt[3]{xy^2}$