# MTH 28, Midterm 2, V. 4, 10/29/25 Prof. Luis Fernández

**NAME:** SOLUTION

**There are 19 questions. Some are multiple choice and some are free response.**
**Each question is worth 6 points over 100 (so 14 points are extra credit).**
**For multiple-choice questions, just circle your answer.**
**For free-response questions, SHOW ALL WORK to receive credit.**

**1.** Add and simplify.

$$\frac{x-1}{x+4}+\frac{x+3}{x+2}$$

**Solution:**

$$\boxed{\frac{2x^2+8x+10}{(x+4)(x+2)}}$$

**2.** Simplify the rational expression.

$$\frac{x^2-2x-8}{x-4}$$

**Solution:**

$\boxed{x+2}$.

**3.** Simplify the expression

$$\frac{x^2-4}{x^2-3x+2}$$

**Solution:**

$$\boxed{\frac{x+2}{x-1}}$$

**4.** Multiply and simplify your answer.

$$\frac{x-4}{x}\cdot\frac{x^2+3x}{x^2-x-12}$$

**Solution:**

$\boxed{1}$

**5.** Multiply and simplify

$$\frac{x^2-x-30}{x^2-10x+24}\cdot\frac{x^2-16}{x^2+8x+16}$$

**Solution:**

$$\boxed{\frac{x+5}{x+4}}$$

**6.** Divide and simplify your answer.

$$\frac{x^2+7x}{10}\div\frac{x+7}{2}$$

**Solution:**

$$\boxed{\frac{x}{5}}$$

**7.** Divide and simplify your answer.

$$\frac{x^2-25}{x^2-11x+30}\div\frac{x}{x-6}$$

**Solution:**

$$\boxed{\frac{x+5}{x}}$$

**8.** Multiply and simplify your answer.

$$\frac{x^2-4}{x^2-3x+2}\cdot\frac{x-1}{x}$$

**Solution:**

$$\boxed{\frac{x+2}{x}}$$

**9.** Add and simplify

$$\frac{5}{x^2} + \frac{2}{x^2 + x}$$

**Solution:**

$$\boxed{\frac{7x + 5}{x^2(x + 1)}}$$

**10.** Add and simplify

$$\frac{5}{y - 3} + \frac{3}{y + 5}$$

**Solution:**

$$\boxed{\frac{8y + 16}{(y - 3)(y + 5)} \text{ or } \frac{8(y + 2)}{(y - 3)(y + 5)}}$$

**11.** Match the expressions below with the letters labeling their equivalent expressions.

$\boxed{A}$ 1. $\dfrac{1}{x - 3} + \dfrac{1}{x^2 - 9}$

$\boxed{C}$ 2. $\dfrac{1}{x + 3} + \dfrac{1}{x^2 + 9}$

$\boxed{B}$ 3. $\dfrac{1}{x - 3} + \dfrac{1}{x^2 + 9}$

A. $\dfrac{x + 4}{x^2 - 9}$

B. $\dfrac{x^2 + x + 6}{(x - 3)(x^2 + 9)}$

C. $\dfrac{x^2 + x + 12}{(x + 3)(x^2 + 9)}$

**Solution:**

$$\boxed{\frac{1}{(x + 3)(x + 4)}}.$$

**12.** Subtract and simplify

$$\frac{1}{x + 3} - \frac{1}{x + 4}$$

**Solution:**

$$\boxed{\frac{1}{(x + 3)(x + 4)}}.$$

**13.** Simplify the expression

$$\frac{1+\dfrac{4}{c-4}}{1-\dfrac{4}{c-4}}$$

**Solution:**

$$\boxed{\frac{c}{c-8}}$$

**14.** Simplify the expresion

$$\frac{\dfrac{x^3}{x-7}}{\dfrac{x^7}{x^2-2x-35}}$$

**Solution:**

$$\boxed{\frac{x+5}{x^4}}.$$

**15.** Subtract and simplify

$$\frac{2x}{x^2+3x-4}-\frac{1}{x-1}$$

**Solution:**

$$\boxed{\frac{x-4}{(x-1)(x+4)}}.$$

**16.** Solve the following equation:

$$x + \frac{1}{x} = 2$$

**Solution:** $\boxed{x = 1}$.

**17.** Solve the equation: $\dfrac{x}{4x - 12} - \dfrac{x - 4}{x - 3} = 1.$

**Solution:** $\boxed{x = 4}$.

**18.** Solve the following equation:

$$\frac{x+1}{x-1} = \frac{-10}{x+3} + \frac{8}{x^2+2x-3}$$

**Solution:** $\boxed{x = -15}$. Note that $x = 1$ is not a solution.

**19.** Solve the following equation:

$$\frac{4}{x^2-25} + \frac{3}{x-5} = \frac{2}{x+5}$$

**Solution:** $\boxed{x = -29}$.