MTH 28, Midterm 2, V. 1, 10/23/24 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. Simplify the expression

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

Solution:

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

2. Simplify the rational expression.

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

Solution:

$\boxed{x+2}$.

3. Multiply and simplify your answer.

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

Solution:

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

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. Add and simplify.

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

Solution:

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

9. Add and simplify

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

Solution:

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

10. Add and simplify

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

Solution:

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

11. Subtract and simplify

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

Solution:

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

12. Subtract and simplify

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

Solution:

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

13. 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:

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

14. Simplify the expresion

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

Solution:

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

15. Simplify the expression

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

Solution:

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

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

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

17. Solve the following equation:

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

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

18. Solve the following equation:

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

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

19. 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.