

MATH 1111 Practice FINAL EXAM #4

1. Simplify:

$$\frac{18x^2y}{3x^5y^{-3}}$$

2. Perform the indicated operations and simplify. Leave your answer in factored form.

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

3. Simplify: $(27x^6y^3)^{1/3}$. Assume all variables are positive.

4. Rationalize the denominator:

$$\frac{5}{\sqrt{3}+1}$$

5. Terra has test grades of 75,88,92,80, and 95. If the final exam counts as two test grades, what does she need to make on the final exam to have an 80 average?

6. Solve the equation in the complex number system:

$$x^2 + 5x + 7 = 0$$

7. Solve the equation:

$$6x^3 + 3x^2 - 9x = 0$$

8. Solve the equation:

$$|9x + 2| = 20$$

9. Solve the inequality:

$$1 - \frac{1}{3}x \geq 8$$

10. Solve the inequality:

$$\frac{x+7}{x-2} < 0$$

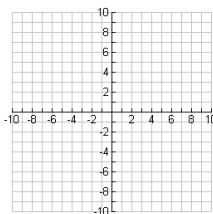
11. Perform the indicated operation. Express your answer in the form $a + bi$.

$$(3 - i)^2$$

12. An inlet pump can fill a water tower in 15 hours and an outlet pump can empty the water tower in 20 hours. If both pumps are left open, how long will it take the water tower to fill?

13. Sketch the graph of the line described by the equation:

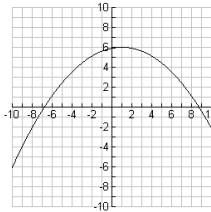
$$2x + y = 6$$



14. Find the slope of the line containing the points $(2, 0)$ and $(5, -2)$.

15. The cost C , in dollars of renting a car for a day is given by the function $C(x) = 0.35x + 40$, where x is the number of miles driven. If the cost of renting this car was \$103.70, how many miles were driven?

16. Find the equation of the line which is perpendicular to the line $y = -\frac{1}{2}x + 3$ and passes through the point $(6, -5)$.
17. The elongation E of a spring balance varies directly with the applied weight W . If $E = 3$ when $W = 27$, find E when $W = 45$.
18. Find the x -intercept(s) for the graph of the function given by $q(x) = x^2 - 8x - 9$.
19. Find the domain of the function:
- $$f(x) = \frac{x + 5}{x - 9}$$
20. Given the graph of f below, find $f(8)$.



21. Given $f(x) = x^2 - 2$ and $g(x) = x + 4$, find $(f \circ g)(x)$.
22. Find the vertex of the parabola that is the graph of the function given by:
- $$f(x) = x^2 - 10x + 18$$
23. Find the remainder when $3x^3 - x^2 + 7x - 3$ is divided by $x - 2$.
24. Given that $f(x) = \frac{4}{x - 1}$. Find $f^{-1}(x)$ where f^{-1} is the inverse of f .
25. Change the following exponential expression to an equivalent expression involving a logarithm.
- $$e^{x-2} = 5$$
26. Solve for x . Express your answer using the exact value or a three decimal place approximation.
- $$2^x = 4^{1-2x}$$
27. Solve the equation:
- $$\log x + \log(x + 15) = 2$$
28. How many years will it take an initial investment of \$5,000 to grow to \$6,000 if it is invested at 5% compounded continuously? Use one of the formulas given. Round your answer to one decimal place.

$$A = P \left(1 + \frac{r}{n}\right)^{nt} \quad \text{OR} \quad A = Pe^{rt}$$

29. Solve the system of equations: $\begin{cases} x + 2y = 7 \\ 2x - 3y = 28 \end{cases}$
30. The function f is defined by: $f(x) = \begin{cases} 3x - 1 & \text{if } -3 \leq x < 0 \\ x^2 + 5 & \text{if } 0 \leq x < 2 \\ -x & \text{if } 2 \leq x \leq 4 \end{cases}$ Find $f(2)$.