

MATH 1111 Practice FINAL EXAM #1

1. Simplify: $\frac{32(x^2y^{-1})^2}{8xy^{-1}}$
2. Add the rational expressions and write the answer as a single rational expression in factored form. Reduce your answer to lowest terms:

$$\frac{x}{x^2 - 4} + \frac{1}{x^2 + x - 6}$$

3. Simplify: $(125x^6y^3)^{1/3}$
4. Rationalize the denominator: $\frac{1}{1 + \sqrt{2}}$
5. Solve the equation: $\frac{1}{x} - 3 = 0$
6. Solve the equation over the complex number system: $x^2 + x + 1 = 0$
7. Solve the equation: $\sqrt{2x + 7} - 2 = x$
8. Solve the inequality: $5 - 3x \leq 7$
9. Solve the equation: $|\frac{1}{2}x - 3| = 5$
10. Brittany can run a mile in 6 minutes and Christina can run a mile in 9 minutes. If both Brittany and Christina start running at the same time and Brittany starts $\frac{1}{3}$ of a mile behind Christina, how long will it take Brittany to catch up with Christina?
11. A company breaks even when its revenue is the same as its cost. Suppose that the revenue for the ACME company is given by $R(x) = 8x$ and the cost for the ACME company is given by $C(x) = 4.5x + 17500$ where in each case x represents the number of widgets produced and sold each day. How many widgets must the ACME company produce and sell to break even on a given day?
12. Find an equation of the line that passes through the points $(-4, 0)$ and $(0, 4)$.
13. Find the **slope** of a line that is perpendicular to the line

$$y = -\frac{1}{3}x - 1.$$

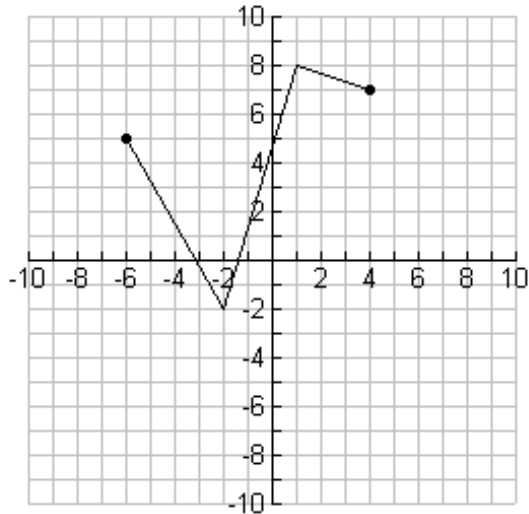
14. BMI (body mass index) varies directly with one's weight and inversely with the square of one's height. A person who weighs 152 pounds and is 70 inches tall has a BMI of 21.8. What is the BMI of a person who weighs 242 pounds and is 72 inches tall? Round your answer to one decimal place.
15. Find the domain of the function given by $f(x) = \sqrt{x + 4}$.
16. Perform the multiplication and simplify:

$$(x + 1) \cdot (x^2 + 2x + 1)$$

17. Suppose that $f(x) = 3x + 1$. Simplify the expression $\frac{f(x + h) - f(x)}{h}$ where $h \neq 0$.
18. Find the x -intercept(s) for the graph of the function given by

$$f(x) = 6x^2 - 11x - 10.$$

19. Determine the range of the function whose graph is shown.



20. The function f is defined by: $f(x) = \begin{cases} x + 2 & \text{if } x < 0 \\ 5 & \text{if } 0 \leq x \leq 1 \\ 3 - x & \text{if } x > 1 \end{cases}$ Find $f(5)$.

21. Find the vertex of the parabola that is the graph of the equation

$$y = x^2 + 4x - 7.$$

22. Solve the inequality: $\frac{x + 3}{x - 7} \leq 0$

23. Find the remainder when $5x^4 - x^2 - 2$ is divided by $x + 2$.

24. Let $f(x) = x^2 - 2x + 1$ and $g(x) = \frac{4x}{x - 3}$. Find $(f \circ g)(5)$.

25. Suppose that $f(x) = 2x + 5$. Find $f^{-1}(x)$ where f^{-1} is the inverse of f .

26. Evaluate $\log_3\left(\frac{1}{27}\right)$.

27. Solve for x . Express your answer using the exact value or a three decimal place approximation.
 $e^{3x+1} = 16$

28. Solve the equation exactly: $\log_{10} x + \log_{10}(x + 3) = 1$

29. How long will it take an investment of \$10,000 to grow to \$25,000 if the money is invested at 6% compounded continuously? Use one of the formulas given. Round your answer to one decimal place.

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

30. Solve the system of equations: $\begin{cases} 4x - y = -2 \\ 2x + 3y = -8 \end{cases}$