

Math Analysis Practice Final Exam Problems

Free Response:

1. Graph $f(x) = \frac{2x^2 + 5x + 2}{x^2 - x - 2}$
showing all asymptotes and intercepts
2. Graph $f(x) = -8x^4 + 32x^2$
showing all intercepts and correct end behavior
3. Solve for x: $\log_3(x+2) - \log_3 x = 3$
4. Solve for x: $x^4 - 6x^3 + 9x^2 + 6x - 10 = 0$
5. Graph each function:
 - a. $f(x) = (x+2)^3 - 2$
 - b. $f(x) = 2|x-3| + 5$
 - c. $f(x) = -\sqrt{x+5}$
 - d. $f(x) = x^2 + 2x - 8$
 - e. $f(x) = \log_3(x-3) - 5$
 - f. $f(x) = 3^{x-3} + 2$(Show vertex and y-intercept).

6. A bottle of spring water with an initial temperature of 90°F is placed in a freezer with a temperature of 29°F. After 15 minutes, the temperature of the water drops to 75°F. The equation for the drop in temperature is $T_f = T_r + (T_o - T_r)e^{-rt}$, where T_f is the final temperature of the object after t minutes, T_r is the temperature of the surrounding air, T_o is the original temperature of the object and r is the rate at which the object is cooling. Find the rate of cooling, r , and then determine how long it will take the water to reach 32°F.

Multiple Choice:

1. Find the vertex of the following given parabola: $y = x^2 - 4x - 5$
A (5, -1) B (2, -9) C (4, -5) D (2, -5)
2. Determine the left and right behavior of the graph: $f(x) = -x^5 + 2x^2 - 1$
A Up, Down $\nearrow\searrow$ B Down, Up $\searrow\nearrow$ C Up, Up $\nearrow\nearrow$ D Down, Down $\searrow\searrow$
3. Divide $(6x^3 + 7x^2 - 15x + 6) \div (x - 2)$
A $6x^2 - 5x - 25 - \frac{44}{x-2}$ B $3x^2 + 13x + 9 + \frac{24}{x-2}$
C $6x^2 + 19x + 23 + \frac{52}{x-2}$ D $6x^2 - 5x + 5 - \frac{4}{x-2}$
4. Write as a product of linear factors: $f(x) = x^4 - 3x^2 - 28$.
A $(x^2 + 4)(x^2 - 7)$ B $(x - 2i)(x + 2i)(x - \sqrt{7})(x + \sqrt{7})$
C $(x + 2i)(x + 2i)(x + \sqrt{7})(x - \sqrt{7})$ D $(x - 2i)(x - 2i)(x - \sqrt{7})(x + \sqrt{7})$

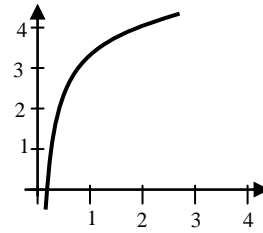
5. Match the graph with the correct function.

A $f(x) = 3 + \log x$

B $f(x) = \log(x+3)$

C $f(x) = \frac{1}{3} \log x$

D $f(x) = 3 \log x$



6. Write the function in exponential form: $\log_b 7 = 13$.

A $7^{13} = b$

B $b^{13} = 7$

C $b^7 = 13$

D $7^b = 13$

7. Solve for x : $\ln(7-x) + \ln(3x+5) = \ln(24x)$

A $\frac{6}{11}$

B $\frac{7}{3}$

C $\frac{7}{3}, -5$

D $\frac{6}{11}, 5$

8. Solve for x : $3x^2 - 4x + 2 = 0$.

A $x = \frac{2 \pm \sqrt{2}i}{3}$

B $x = \frac{2 \pm 2\sqrt{10}}{3}$

C $x = \frac{2 \pm 2\sqrt{2}i}{3}$

D $x = \frac{2 \pm \sqrt{10}}{3}$

9. Find the y-intercept(s): $f(x) = \frac{x^2 - 1}{x^2 + 9}$.

A (0, 1) (0, -1)

B (0, -1/9)

C (0, -1)

D (0, 9)

10. Find the x-intercept(s): $f(x) = 3x^3 - 12x$

A (3, 0) (4, 0) (-4, 0)

B (3, 0) (2, 0) (2, 0)

C (0, 0) (3, 0) (4, 0)

D (0, 0) (2, 0) (-2, 0)

11. Find the domain: $f(x) = \sqrt{x-5} + 7$

A $[5, \infty)$

B $(-\infty, 5]$

C $[5, 7]$

D $(-\infty, \infty)$

12. Find an equation of the line that passes through $(-1, -3)$ and is parallel to the line $2x + y = 19$.

A $y = -2x - 3$

B $y = -2x - 5$

C $y = 2x - 1$

D $y = -\frac{1}{2}x - \frac{7}{2}$

13. Given $f(x) = x^2 - 2x$ and $g(x) = 3 + 2x$, find $(f \circ g)(x)$.

A $4x^2 + 8x + 3$

B $4x^2 + 10x + 9$

C $2x^2 - 4x + 3$

D $3x^2 + x$

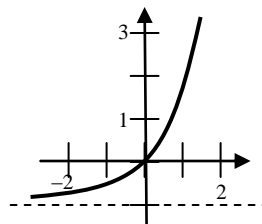
14. Match the graph with the correct function.

A $y = 3^{x-1}$

B $y = 3^x - 1$

C $y = 3^{1-x}$

D $y = 3^{-x} - 1$



15. Find the sum: $\sum_{n=1}^{500} (3n + 5)$
A 756,500 B 376,500 C 752,500 D 378,250
16. Find the sum of the infinite geometric sequence: $-7, -\frac{7}{3}, -\frac{7}{9}, -\frac{7}{27}, \dots$
A -5 B $-\frac{21}{4}$ C $-\frac{5}{2}$ D $-\frac{21}{2}$
17. Evaluate: $\sum_{n=0}^{\infty} 3\left(-\frac{1}{2}\right)^n$
A 6 B 4 C 2 D 0
18. Solve for x: $18 = 3e^{2x}$
A $\frac{\ln 6}{2}$ B $\frac{\ln 18}{3}$ C 3 D $\frac{\ln 15}{2}$
19. Solve for x: $f(x) = \log_2(2x + 5) - \log_2(x + 1) = 3$
A 2 B $-\frac{1}{2}$ C 1 D -4
20. Find the domain for the function $f(x) = \frac{x - 5}{x^2 - 4x - 12}$
A all real numbers B all real numbers except 5, 6, and -2
C all real numbers except 5 D all real numbers except 6 and -2
21. Find all the real roots: $x^3 - 7x + 6 = 0$
A $-1, 1, 6$ B $-3, 1, 2$ C $-2, -2, 3$ D $-6, -1, 1$