

Math 150 Final Exam Review Problem Set

(Note: This review does NOT cover every concept or type of problem that could be included on your final. You should also study your old exams, homework, notes, quizzes, and past Week in Reviews to be fully prepared.)

(Problems 2b and 16 were taken or modified from *A Graphical Approach to Precalculus* by Hornsby/Lial/Rockswold)

1. Solve the following systems of equations.

$$(a) \begin{cases} x^2y = 20 \\ x^2 + y = 9 \end{cases}$$

$$(b) \begin{cases} 7x^2 + 8y = -5 \\ 4x^2 + 3y = 16 \end{cases}$$

2. Solve the following equations.

$$(a) |-8x - 9| \geq 7$$

$$(b) \sqrt{4 - 3x} - x = 8$$

3. Find the domains of the following functions.

$$(a) \frac{\sqrt{6x^2 + x - 1}}{\sin^{-1} x}$$

$$(b) \frac{\log(-3x + 8)}{\sqrt[3]{x^2 + 3x - 28}}$$

4. Find the average rate of change of the function $f(x) = -3x^2 - x + 4$ from $x = -2$ to $x = 3$.

5. Consider the quadratic function $f(x) = 3x^2 + 4x - 1$.

(a) What is the vertex of this parabola?

(b) What are the x -intercepts of this function?

6. For the functions $f(x) = \frac{x}{x-3}$ and $g(x) = \frac{5}{x-1}$, find $(f \circ g)(x)$.

7. Find the inverse of the function $f(x) = \frac{x-2}{x+1}$.

8. How would the graph of $g(x) = -\frac{1}{5}f(x-3) + 6$ be obtained from the graph of f ?

9. Find any asymptotes, intercepts, and holes for the rational function $r(x) = \frac{9x^2 - 25}{(3x^2 - 11x + 10)(x + 4)}$.

10. Consider the polynomial $P(x) = -3x^3 + 2x^2 + 12x - 8$.

(a) Find the zeros of this polynomial.

(b) Find the quotient and remainder when $P(x)$ is divided by $x^2 - 2x + 3$.

11. Perform the multiplication and write in standard form: $(8 - \sqrt{-25})(-3 + \sqrt{-4})$

12. Solve the following equations.

$$(a) 3 \cdot 5^{x-2} = 8$$

$$(b) \log_{100} x + \log_{100}(3x - 13) = \frac{1}{2}$$

13. Rewrite the following expression as a single logarithm:

$$\frac{1}{3} \log p^2 - \frac{3}{4} \log 16p^4 - \frac{2}{3} \log 8(p^3 + 27)$$

14. Find the exact value of the indicated part of the triangle from the given information.

(a) Given: $C = 30^\circ$, $B = \frac{3\pi}{4}$, $b = 5$; Find the exact value of c .

(b) Given: $A = 120^\circ$, $b = 3$, $c = 5$; Find the exact value of a .

15. Given that $\tan x = \frac{1}{3}$ with x in Quadrant III and that $\cot y = -\frac{3}{2}$ with y in Quadrant II, find the exact values of the following:

(a) $\csc x$

(b) $\sin 2y$

(c) $\cos(x - y)$

16. Find the exact value of $\sin(\cos^{-1} \frac{2}{3} + \tan^{-1} \frac{4}{5})$.

17. Find all solutions to the equation $(2 \sin \frac{x}{4} + \sqrt{3})(\sqrt{2} \cos 6x - 1) = 0$.

18. Two forces are acting on an object. The first force has a magnitude of 10 pounds and is applied in the direction 30° . The second force is given by the vector $\mathbf{F}_2 = -3\mathbf{j}$. What is the total resulting force? What is its magnitude and direction?

19. A vector \mathbf{u} has initial point $(-3, 6)$ and terminal point $(-1, 7)$. A second vector \mathbf{v} has magnitude $\sqrt{10}$, a vertical component of 1, and has a direction θ where $\tan \theta < 0$.

(a) Find $\mathbf{u} \cdot \mathbf{v}$

(b) What is the angle between \mathbf{u} and \mathbf{v} ?

20. Determine whether the following represent a parabola, ellipse, or hyperbola by writing the equation in standard form. What is the center of the conic?

(a) $x^2 - 6x - 4y^2 - 40y - 95 = 0$

(b) $x^2 + 6(y - 7)^2 = 36$