Math 150 Final Exam Review Problem Set

(Note: This review does NOT cover every topic 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. Conversely, not everything covered in this review may be on your final.)

(Problems 3a, 11, and 16 were taken or modified from *A Graphical Approach to Precalculus* by Hornsby/Lial/Rockswold)

1. (a) Find an equation of the parabola with vertex at the origin and focus $(0, -3)$.

   (b) What are the directrix and focal diameter of this parabola?

2. (a) Find the equation of the ellipse centered at the origin with eccentricity $\frac{1}{2}$ with vertices $(\pm 6, 0)$.

   (b) What are the foci and the lengths of the major and minor axes?

3. Solve the following.

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

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

4. Find the domains of the following functions.

   (a) $\dfrac{\sqrt{x^2+4x-12}}{\sqrt[3]{x-3}}$

   (b) $\dfrac{\log(-3x+8)}{x^2+3x-28}$

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

6. 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?

7. For the functions $f(x) = \dfrac{2}{x-3}$ and $g(x) = \dfrac{5}{x-1}$, find $(f \circ g)(x)$.

8. Find the inverse of the function $f(x) = \dfrac{x}{x+1}$.

9. Find all zeros of the polynomial $p(x) = x^3 + 4x^2 + 8x + 5$.

10. Find all asymptotes for the rational function $r(x) = \dfrac{9x^2 - 25}{2x^2 - 5x - 3}$.

11. Perform the multiplication and write in standard form: $(-12 - \sqrt{-25})(3 + \sqrt{-4})$

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 indicated part of the triangle from the given information.

    (a) Given: $C = 30°$, $B = \frac{3\pi}{4}$, $b = 5$; Find: c

    (b) Given: $A = 120°$, $b = 3$, $c = 5$; Find: 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 following:

    (a) $\csc x$

    (b) $\sin 2y$

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

16. Evaluate $\sin(\cos^{-1}\frac{2}{3}+\tan^{-1}\frac{4}{5})$.

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?

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 $\mathbf{v}$?