Math 1110: Algebra and Trigonometry Self-Assessment

The answer key for this Self-Assessment is posted on our section website: http://www.cam.cornell.edu/~ksullivan/math1110.html. Please take this assessment without assistance (from people, the internet, notes or books). If you find that there are topics that you do not remember or if you score less than 22 right out of the 27 problems, please plan to attend the algebra and/or trigonometry review sessions or come talk to me about whether a lower level course might be a more appropriate starting place for you.

1. Simplify: \( \frac{(x^2yz^{-2})^3}{(xy^2z)^2} \)

2. Factor: \( 2y^4 - 32x^4 \)

3. Simplify: \( \frac{x}{x^2 + 5x + 6} - \frac{2}{x^2 + 3x + 2} \)

4. Simplify: \( \frac{\sqrt[5]{64x^5y^{-1}}}{\sqrt{2y^4}} \)

5. Simplify: \( 32^{4/5} \)

6. Solve for x: \( (x + a)(x - b) = x^2 - 1 \)

7. The radius of a circular fountain is 10 ft. A sidewalk of uniform width is constructed around the outside of the fountain and has an area of \( 69\pi \) ft\(^2\). How wide is the sidewalk?

8. A train leaves a station and travels north at a speed of 75 mph. Two hours later, a second train leaves on a parallel track traveling north at a speed of 125 mph. How far from the station will the faster train overtake the slower train?

9. Use “completing the square” to rewrite \( x^2 - 4x + 3 = 0 \) in the form \( (x - c)^2 = d \).

10. Given \( f(x) = 3 + x^2 \), find \( f(x + h) - f(x) \)

11. Given \( f(x) = \sqrt{x^2 - 9} \), find \( f(x - 3) \)

12. What is the domain of the function \( y = \frac{5}{\sqrt{a-x^2}} \)?)

13. Find the slope-intercept form of the line through \((1,4)\) and \((3,-2)\).

14. Find the point(s) of intersection of the curves \( x^2 + y^2 = 1 \) and \( x + y = 0 \).
15. Solve for $x$: $2 \leq 5 - 2x \leq 22$

16. Solve for $x$: $|3x - 2| - 6 \geq 0$

17. Solve for $x$: $e^{-4x} = e$.

18. Solve for $x$: $3^{4x+1} - 5 = 22$

19. Is the point $\left( -\frac{\sqrt{35}}{6}, -\frac{1}{6} \right)$ inside, outside, or on the unit circle?

20. Find $z$ given that $\sin(z) = -\cos(z)$ and $\frac{3\pi}{2} \leq z \leq 2\pi$.

21. Given $f(x) = \sin(4x)$, find $f(\frac{x}{3})$.

22. Given: $2\sin(x) = 1$, and $90^\circ \leq x \leq 180^\circ$, find $x$.

23. Complete the trigonometric identity: $\sin(\pi - \theta) =$

24. Given $\sin(x) = -3/5$ and $x$ is in Quadrant III, find $\tan(x)$.

25. In the figure, $\cot(\theta)$ is defined by what ratio?

26. What is the period of $y = \sin(-2x)$?

27. Simplify the expression: $\frac{\cot \theta \sec \theta}{\csc^2 \theta}$

28. Simplify the expression: $(\sec t - \tan t)(\sec t + \tan t)$