# Math 007 Precalculus – Final exam

Each problem is worth 10 points. Show all work!

1. Given the function $f(x) = \frac{-2x}{4-x}$, (a) find its inverse, and (b) find the domain and range of f and f^{-1}.

2. Determine the domain of $f(x) = \ln(\frac{1}{x+2})$.

3. Use the rules for logarithms of products, quotients, and powers to write as the sum or difference of logarithms: $\log[\frac{x^2\sqrt{x+4}}{(x-1)^3}]$, where $x > 1$.

4. Solve for x: $\log_3 x - \log_3 5 = 4$

5. Solve for x: $\pi^{2x+1} = e^{3-x}$

6. If $\$5,000$ is invested for 2 years at 8% per year, compounded quarterly, find the value of the investment at the end of the 2 years.

7. For a circle of radius 10 feet, find the arc length s subtended by a central angle of $80°$.

8. An object is traveling around a circle with a radius of 2 meters. If in 5 seconds a central angle of 4 radians is swept out, what is the linear speed of the object?

9. Determine the exact value of the trigonometric functions listed below.

    (a) $\sin 120°$

    (b) $\tan 315°$

    (c) $\cos(-240°)$

10. Given $\sin\theta = \frac{12}{13}$, θ an acute angle, find the exact value of the six trigonometric functions of θ.

11. For the equation $y = -4\sin(3x)$, identify (a) the amplitude, and (b) the period.

12. Solve for x: $2^{5+2x} = \frac{1}{32}$.

13. Use the change-of-base formula to write $\log_7 15$ in terms of natural logarithms.

14. If $\cos\theta = \frac{3}{7}$ and θ terminates in the first quadrant, find the exact value of the following.

    (a) $\sin(2\theta)$.

    (b) $\cos(\frac{\theta}{2})$

15. Establish the identity: $\frac{\csc\theta}{1-\cos\theta} = \frac{1+\cos\theta}{\sin^3\theta}$.

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

17. Given the following triangle, find sides a and b, and $\angle C$.
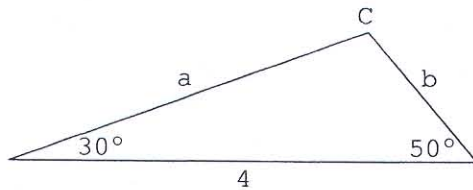
18. Find the area of the triangle with $\angle A = 20°$, $b = 6$ feet, and $c = 10$ feet.

19. Find the center and foci of the ellipse having the equation $4x^2 + 25y^2 - 16x - 50y - 59 = 0$, and then graph the ellipse.

20. Solve the given linear system of equations:
$$\begin{aligned} 2x &- y + 3z &= 7 \\ x &+ y - z &= -7 \\ x &- 2y &= -10 \end{aligned}$$