

MAT Review Questions

(Disclaimer: This is a study guide. It does not cover all topics, and does not necessarily represent every type of question on the final.)

- Solve for x: $\ln(x - 2) + \ln(2x - 3) = 2 \ln x$
- Solve for x: $3 \tan^2 x - 1 = 0$
- Verify: $\frac{\sec^2 \theta - 1}{\sec^2 \theta} = \sin^2 \theta$
- Find $\cos(u - v)$ given
 $\cos u = -\frac{15}{17}, \pi < u < \frac{3\pi}{2}, \sin v = \frac{4}{5}, 0 < v < \frac{\pi}{2}$
- Simplify: $\sin x \cos^2 x - \sin x$
- Find the exact value:
 $\cos(175^\circ) \cos(55^\circ) + \sin(175^\circ) \sin(55^\circ)$
- Find the exact value $\tan 285^\circ$ (use an identity)
- Solve the triangle. $A = 26^\circ, B = 51^\circ, c = 20$
- Verify the identity: $\sin^2 x + \sin^2 x \cot^2 x = 1$
- Solve the triangle: $b=2, c=4, A = 80^\circ$
- Find the exact value: $\sin \frac{3\pi}{8}$ (Use a formula.)
- A card is drawn at random from a standard deck of playing cards. What is the probability that it is an ace or a spade.
- Use the Binomial Theorem to expand and simplify: $(i - 2)^4$
- Evaluate: $\sum_{n=0}^{\infty} 2 \left(\frac{1}{2}\right)^n$
- Graph and find the characteristics: $x^2 + 4x + 8y - 20 = 0$
- Solve for x: $16 = 2^{7x-5}$
- Graph: (Label points, asymptotes, intercepts, domain, etc)
 $f(x) = 2^{x+2} - 3$
- Graph: (Label points, asymptotes, intercepts, domain, etc)
 $f(x) = -\log_5(x - 1) + 1$
- Evaluate: a) $\log_{10} \frac{1}{100}$ b) $\log_3 1$ c) $\log_4 2$
- Solve: $3 \cdot 2^x = 10$
- An investment is made in a trust fund of an annual percentage rate of 9.5% compounded quarterly. How long will it take for the investment to double in value?
- Solve: $5 + 2 \ln x = 4$
- Rewrite using the logarithmic properties: $\ln \left(\frac{\sqrt{3x-5}}{7y} \right)$
- In how many ways can a subcommittee of five people be selected from a committee of ten people?
- Solve the matrix equation $BX - C = 3C$ where
 $B = \begin{bmatrix} 2 & 1 \\ -2 & -3 \end{bmatrix}$ and $C = \begin{bmatrix} 0 & 1 \\ -1 & 1 \end{bmatrix}$
- Graph and find the characteristics:
 $4x^2 + 9y^2 - 32x + 18y + 37 = 0$
- Find the exact value of $\sin 75^\circ$ ($75 = 45 + 30$)
- Solve $2 \cos(3x) - 1 = 0$ on the interval $[0, 2\pi)$
- Given a triangle with $c = 102.3^\circ, B = 28.7^\circ$, and $b = 27.4$ feet, find the remaining angle and sides.
- Add and simplify: $\frac{\cos x}{1 + \sin x} + \frac{1 + \sin x}{\cos x}$
- Solve the triangle: $C = 35^\circ, a = 18.7, c = 16.1$
- Solve the equation on the interval $[0, 2\pi)$.
 $\sin 4x = \frac{\sqrt{3}}{2}$
- Verify the identity: $\frac{(\tan x + 1)^2 - \sec^2 x}{\tan x} = 2$
- Find the exact value: $\cos(135^\circ + 240^\circ)$
- Find $\sin 2\theta \cdot \cos \theta = \frac{24}{25}$, θ lies in quadrant 4.
- Find the exact value of $\sin(\alpha + \beta)$, given $\tan \alpha = \frac{24}{7}$, α lies in quadrant III, and $\cos \beta = -\frac{20}{29}$, β lies in quadrant II.
- Solve for x and y:
 $x^2 + y^2 = 25$
 $4x + y^2 = -7$
- Find the sum: $\sum_{n=5}^{100} 3n - 2$
- The function $A = A_0 e^{-0.01155x}$ models the amount in pounds of a particular radioactive material stored in a concrete vault, where x is the number of years since the material was put into the vault. If 600 pounds of the material are placed in the vault, how much time will need to pass for only 267 pounds to remain?
- Given $\ln 2 \approx 0.693, \ln 3 \approx 1.099$, and $\ln 7 \approx 1.746$, use the properties of logarithms to evaluate:
a) $\ln 6$ b) $\ln \frac{7}{27}$
- If a license plate number consists of two letters followed by 2 numbers, how many different license plate numbers are possible?
- A total of \$12,000 is invested at an annual percentage rate of 9% compounded continuously. Find the balance after 5 years.
- Solve: $5 + 2 \log_3 x = 4$
- Solve the system of equations using Cramers rule, the inverse method, and by putting a matrix in row echelon form:
 $x + 2y - 3z = -7$
 $6x + 5y = 13$
A) $3x - y + 2z = 8$ B) $5x + 4y = 10$
 $2x - y + z = 5$