

You may keep this page of questions. Turn in your answers with all of your work on the green paper and pink paper. You are **NOT** allowed to use calculators on questions #1 – 10. Work these questions on the green paper. After you have finished these first ten questions, turn in the first part of the exam and receive pink paper to use for the last five questions.

(1) 10 Points. If θ is an angle in standard position whose terminal side passes through the point $(-4, -1)$, sketch a graph showing θ and find values for the six trigonometric functions at θ .

(2) 12 Points. Find $f^{-1}(x)$ if $f(x) = e^{2x-3}$.

(3) 12 Points. Find the standard parametric representation for the circle $x^2 + y^2 = 25$.

(4) 12 Points. Graph the equation $y = 2 \cos\left(\frac{\pi}{6}x\right)$. Mark scales on axes!

(5) 12 Points. Sketch a graph of the equation $y = -4 + \frac{1}{(x-3)^2}$. Find coordinates for all intercepts and find equations for all asymptotes.

(6) 12 Points. Sketch a graph of the polar equation $r = 4 \sin \theta$.

(7) 15 Points. Find exact values for the following:

(a) $\sin(225^\circ)$ (b) $\cos^{-1}\left(\frac{-1}{2}\right)$ (c) $\cos\left(\frac{5\pi}{6} + \tan^{-1}\left(\frac{-2}{3}\right)\right)$.

(8) 15 Points. Given that $\log_b(2) = 2.28$, $\log_b(3) = 3.61$, $\log_b(5) = 5.29$ and $\log_b(7) = 6.40$, use these (and laws of logarithms) to compute

(a) $\log_b\left(\frac{10}{3}\right)$ (b) $\log_b(7^{10})$ (c) $\log_b \sqrt{1^2 + 2^2 + 3^2}$.

(9) 10 Points. Express $\sin(15x) - \sin(7x)$ as a product.

(10) 16 Points. Use basic trigonometric identities and algebra to verify that

$$\frac{3 \sin^2 t + 5 \sin t + 2}{\cos^2 t} = \frac{2 + 3 \sin t}{1 - \sin t} \quad \text{is an identity.}$$

Your proof needs to be **logically** correct as well as algebraically correct and trigonometrically correct.

Turn in your work and answers for the first ten questions and any remaining green paper before continuing.

(11) 10 Points. Solve $3^{2x-7} = 89$. Find both an **exact** answer and a decimal approximation accurate to the nearest thousandth.

(12) 20 Points. Use your calculator to approximate each of the following. Round appropriately. Use **radian** mode when evaluating inverse trigonometric functions.

(a) $\cot(175^\circ 53' 19'')$ (b) $\sin(4.127)$ (c) $\arcsin(-0.21388)$
(d) $\sec^{-1}(2.39)$ (e) $\log_{5.017}(28.76)$

(13) 14 Points. Approximate, in degrees, all solutions of the equation $\cos(3\beta) = -0.4112$.

(14) 14 Points. Solve triangle ABC if $\beta = 21.8^\circ$, $b = 4.07\text{m}$ and $c = 6.84\text{m}$. Show how you found the missing values.

(15) 16 Points. If a jet airplane climbs at an angle of 14.6° with a constant airspeed of 345 miles per hour, how long will it take (to the nearest hundredth of a minute) to reach an altitude of 8.50 miles? Assume there is no wind and that the airplane is flying over level ground.