

You may keep this page of questions. Turn in your answers with all of your work on the yellow paper and orchid paper. You are **NOT** allowed to use calculators on questions #1 – 5. Work these questions on the yellow paper. After you have finished these first five questions, turn in the first part of the exam and receive orchid paper to use for the last two questions.

(1) 10 Points. Find the rectangular coordinates for the point P if P has polar coordinates $(8, -\frac{5\pi}{6})$.

(2) 20 Points. If θ is an angle with $-\pi < \theta < -\pi/2$ and $\sin \theta = -\frac{2}{3}$, find exact values for the following:

(a) $\cos \theta$ (b) $\cos 2\theta$ (c) $\sin(\theta - \frac{\pi}{3})$ (d) $\tan(\frac{1}{2}\theta)$.
(e) $\cos\left(\frac{\pi}{2} + \arccos\left(\frac{-2}{5}\right)\right)$

(3) 12 Points. Express $\cos(3\beta)\cos(11\beta)$ as a sum or a difference.

(4) 12 Points. Verify that $\frac{1 + \tan(\beta)\cot(\alpha)}{1 - \tan(\beta)\cot(\alpha)} = \frac{\sin(\alpha + \beta)}{\sin(\alpha - \beta)}$ is an identity.

(5) 16 Points. Find exact values, in radians, for all solutions of the equation: $\sin(4x) = -\frac{1}{\sqrt{2}}$.

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

(6) 18 Points. Solve triangle ABC if $a = 31.24\text{cm}$, $b = 53.25\text{cm}$ and $c = 39.89\text{cm}$. Show how you calculated α, β and γ . Find values for α, β and γ to the nearest hundredth of a degree.

(7) 12 Points. Use your calculator to approximate (in radians, to 4 significant digits) all solutions of the equation $2x + 1 = \sin(2x)$.