

PRACTICE EXAM 7 - MATH 140

DATE: Friday, December 15

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Read each problem very carefully before starting to solve it. Each question is worth 5 points. It is necessary to show your work. Correct answers without explanations are worth 0 points.

GOOD LUCK!!

1. A construction manager wants to estimate the height of a tall building. From a certain distance from the base of the building a sighting is taken and the angle of elevation to the top of the building is found to be 60° . From a second point that is 20 meters further away from the building, a second sighting is taken of the top of the building and the new angle of elevation is found to be 45° . Find the height of the building. (4 points) Express your answer in a form that may contain roots but does not contain any trig functions. (1 point)
2. Suppose that in the triangle $\triangle ABC$ if $\alpha = 60^\circ$, $b = 5$ and $c = 3$.
 - (a) Find a . (2 points)
 - (b) Find β and γ . (1.5 points)
 - (c) Find the area A of the triangle $\triangle ABC$. (1.5 points)
3. Convert to rectangular coordinates and **clearly** sketch the graphs of the following equations in separate coordinate systems:
 - (a) $r = 5$. (1 point)
 - (b) $\theta = \frac{5\pi}{4}$ (1 point)
 - (c) $r \sin \theta = -2$ (1 point)
 - (d) $r = 7 \cos \theta$ (2 points)
4. Suppose that $z = 64\sqrt{3} - 64i$.
 - (a) Write z in polar form. (1 point)
 - (b) Find the first complex seventh root of z and write it in the standard form. (2 points)
 - (c) Find the remaining six complex seventh roots of z . Leave your answers in polar form. (2 points)
5. Suppose that $P = (-5, 4)$, $Q = (2, -1)$, $R = (7, 9)$ and $S = (5, 5)$.
 - (a) Find an algebraic vector $\vec{p} = \langle a, b \rangle$ and an algebraic vector $\vec{q} = \langle c, d \rangle$ such that $\vec{p} = \vec{PQ}$ and $\vec{q} = \vec{RS}$. (2 points)
 - (b) Find the algebraic vector $2\vec{p} - 3\vec{q}$. (1 point)
 - (c) Find a point V , such that $\vec{PV} = 2\vec{p} - 3\vec{q}$. (2 points)