

YOUR NAME: _____

CIRCLE YOUR TA's NAME: Mr. Ye Fang Ms. Shantala Mukherjee

Do all eight problems. Each problem or part is worth the indicated number of points. There are 150 points altogether. Do not spend too much time on any one problem. There are eleven printed pages in this exam, including this cover page.

Page	Possible points	Your score
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TOTAL	150	

Problem 2 (12 points) Solve $\triangle ABC$ if $a = 3$, $b = 4$, and $\gamma = \frac{\pi}{3}$. If necessary, leave your answers in terms of the values of trigonometric or inverse trigonometric functions.

Problem 4 Let $\vec{a} = (2, 3)$ and $\vec{b} = (-1, 5)$.

(a) (5 points) Find the vector $\vec{a} + \vec{b}$, and find its length.

(b) (5 points) Find the vector $2\vec{a} - 3\vec{b}$, and find its length.

(c) (5 points) What is the value of $(2\vec{a} - 3\vec{b}) \cdot (\vec{a} + \vec{b})$?

(d) (5 points) Find the angle between the vector $2\vec{a} - 3\vec{b}$ and the vector $\vec{a} + \vec{b}$. If necessary, leave your answer in terms of the value of trigonometric or inverse trigonometric functions.

Problem 6 Suppose that x is an angle in the second quadrant with $\cos(x) = -\frac{1}{3}$. Suppose also that y is an angle with $\sin(y) = -\frac{1}{4}$ and $\tan(y) > 0$.

(a) (5 points) Find $\sin(x)$ and $\cos(y)$.

(b) (6 points) Find $\sin(x + y)$ and $\cos(x + y)$.

(c) (5 points) In which quadrant is the angle $x + y$?

Problem 7 continued:

(c) (8 points) $x^3 - 3x^2 + 7x - 5 = 0$.

(d) (8 points) $\cos^2(x) - \sin^2(x) - 3 \cos(x) = 1$.

Problem 8 continued:

(b) (12 points) Sketch the graph of $y = f(2x) + 3$:

