

Your Name

Your Signature

Student ID #

--	--	--	--	--	--	--

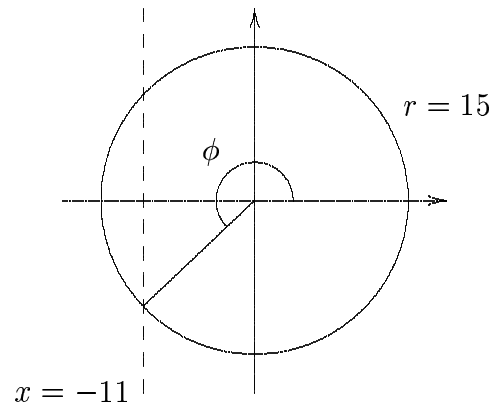
	Aaron	Jung-Eun	Assad
Section	12:30	1:30	12:30
(circle one)	AB	AA	AD
			AC
			AE

Problem	Total Points	Score
1	17	
2	17	
3	17	
4	17	
5	16	
6	16	
Total	100	

- This exam is closed book. You may use one $8\frac{1}{2} \times 11$ sheet of notes.
- Graphing calculators are not allowed.
- Do not share notes or calculators.
- In order to receive credit, you must show your work. Do not do computations in your head. Instead, write them out on the exam paper.
- Place a box around **YOUR FINAL ANSWER** to each question.
- If you use a trial and error (or guess and check) method when an algebraic method is available, you will not receive full credit.
- If you need more room, use the backs of the pages and indicate to the reader that you have done so.
- Raise your hand if you have a question.

1 (17 points) Solve the following.

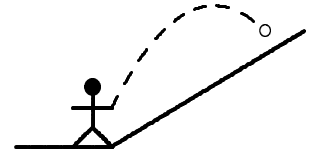
(a) (6 points) Find the angle ϕ .



(b) (5 points) Find x if $7^{x^2-3x} = 5$.

(c) (6 points) Let $g(x) = 5x^2 + 2x$. Compute and simplify $\frac{g(1+h) - g(1)}{h}$. (The answer is not a fraction).

2 (17 points) Clovis is at the golf course. His ball is laying at the bottom of a hill that slopes upward from him at an angle of 42° . No one is looking, so he picks up his ball and throws it up the hill. Placing the origin of our coordinate system where Clovis is standing, the ball's trajectory follows the parabola $y = -0.25x^2 + 2.25x + 6$.



(a) (4 points) What is the ball's maximum height above horizontal?

(b) (5 points) What is the ball's maximum height above the hillside?

(c) (4 points) Where does the ball land on the hillside?

(d) (4 points) How far from Clovis does the ball land?

3 (17 points) In a certain bay, the tides have two maximums and two minimums in each 24 hour day. The water level varies sinusoidally and is measured by marks on a pole in the bay. A high tide is observed at 6 AM, when the water level is at the 17 foot mark. At 10 AM, the water level is at the 11 foot mark.

(a) (7 points) Write a formula for the function $h(t)$ which gives height of water on the pole as a function of time t . (Hint: After you determine B and C , you will have two constants left to find. You are given information about the height at two times.)

(b) (2 points) What is the minimum water level?

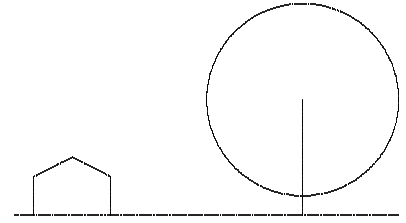
(c) (8 points) In another bay, the function $L(t) = 7 + 3 \sin\left(\frac{\pi}{6}(t - 9)\right)$ gives the water level. For how many hours a day is the water less than 8 feet deep?

- 4 (17 points) The day after finals, Isobel drives from Seattle to Walla Walla. The graph to the right gives her *speed* in miles per hour during the 6 hour trip. Recall that the total distance she has travelled is given by the area under the speed graph.



- (a) (3 points) How fast is she going $3\frac{1}{2}$ hours into the trip?
- (b) (4 points) How far has she travelled 5 hours into the trip?
- (c) (6 points) Find a multipart formula for Isobel's speed on the domain $0 \leq t \leq 6$.
- (d) (4 points) At what time(s) is she going exactly 42 MPH? (round to 2 decimals)

5 (16 points) At the amusement park there is a Ferris Wheel with a 26 foot radius. The center of the wheel is 32 feet above the ground. The wheel rotates clockwise once every 7 minutes. The ticket booth is located 36 feet West of the base of the wheel. Tafu gets on the ride at its lowest point. Use the point on the ground directly under the center of the wheel as the origin of your coordinate system.



- (a) (3 points) What is Tafu's speed in feet per second?
- (b) (6 points) Give parametric equations for his position as a function of time, in minutes.
- (c) (3 points) What is his height above the ground after 8 minutes?
- (d) (4 points) How far is Tafu from the ticket booth at this time?

6 (16 points) At the beginning of 1975, Clovis invested \$6000 in an account that pays interest compounded continuously. At the same time, Isobel invested \$9000 in an account that pays 3% compounded daily. In 1989 Clovis's investment was worth \$10504. Take $t = 0$ in 1975.

(a) (5 points) Give an exponential function relating the value of Clovis's investment y to the year t .

(b) (2 points) What interest rate does he earn on his investment?

(c) (3 points) What was the value of Isobel's investment at the beginning of 1988?

(d) (6 points) In what year will Isobel and Clovis have the same amount of money?