

# Math 112—HW 8 Rubric

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The homework consisted of the following problems

- Section 3.4A (1–4, 6, 9)
- Section 3.5A (1, 6)
- Section 4.1A (1–4, 8)
- 2 Extra problems

## Section 3.4

1. 8 points. 2 points for effort. 1 point each for the correct amplitude, midline, period, and horizontal shift and 1 point for labeling the intercept, max, and min.
2. 3 points. 1 point for each part, graded only on correctness.
3. 8 points. 2 points for effort. 1 point each for parts (a), (b), and (c), graded on correctness. 3 points for part (d), where a score of 1 point means “somewhat correct,” 2 points means “mostly correct,” and 3 points means “completely correct.” Make sure to grade part (d) based on their answers to parts (a), (b), and (c).
4. 8 points. Same as 3.
6. 4 points. 1 point each for  $A, B, h, k$ .
9. 5 points. 1 point for effort, 1 point each for  $A, B, h, k$ .

## Section 3.5

1. 5 points. 1 point for each part, graded only on correctness.
6. 8 points. 2 points for getting to the point where  $\sin(\theta) = -\frac{\sqrt{3}}{2}$ . 4 points total for finding each solution to this between 0 and  $2\pi$  (i.e. finding  $\theta = \frac{4\pi}{3}$  is worth 2 points and  $\theta = \frac{5\pi}{3}$  is worth 2 points). 2 points for extending each solution periodically (i.e. going from their solution(s) between 0 and  $2\pi$  to those solutions plus  $2\pi n$  for integers  $n$ ).

## Section 4.1

1. 2 points, for correctness.
2. 2 points, for correctness.
3. 2 points, for correctness.
4. 3 points, 1 point each for  $\vec{u} + \vec{v}$ ,  $\vec{u} - \vec{v}$ , and  $-3\vec{u}$ .
8. 6 points. 2 points for drawing the correct resultant force. 4 points for finding its magnitude (with partial credit available here).

Extra Problems:

1. Write the following expression without using any powers of trigonometric functions. Make sure to show each step of your work.

$$\cos^2(\theta) \sin^2(\theta)$$

A.

$$\begin{aligned}\cos^2(\theta) \sin^2(\theta) &= \left( \frac{1 + \cos(2\theta)}{2} \right) \left( \frac{1 - \cos(2\theta)}{2} \right) \\ &= \frac{1}{4} (1 - \cos^2(2\theta)) \\ &= \frac{1}{4} \left( 1 - \frac{1 + \cos(4\theta)}{2} \right) \\ &= \frac{1}{8} (1 - \cos(4\theta))\end{aligned}$$

**Grading:** This problem is worth 5 points. 1 point for effort, 2 points for using the power reduction formulas in the first step, and 2 points for using power reduction again.

2. Find an exact value for  $\sin\left(\frac{\pi}{12}\right)$

A.  $\sin^2\left(\frac{\pi}{12}\right) = \frac{1 - \cos\left(\frac{\pi}{6}\right)}{2} = \frac{2 - \sqrt{3}}{4}$ , so  $\sin\left(\frac{\pi}{12}\right) = \sqrt{\frac{2 - \sqrt{3}}{4}}$  since the angle  $\frac{\pi}{12}$  lies in the first quadrant.

**Grading:** This problem is worth 3 points. 1 point for effort, 1 point for being on the right track, 1 point for getting the correct answer.