

Name: Solutions

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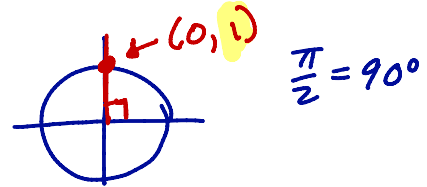
There are 25 points possible on this quiz. No aids (book, calculator, etc.) are permitted. **Show all work for full credit.**

1. [6 points] Evaluate the trigonometric functions below. Assume all angles are in radians.

a. $\sin(\pi/2) =$

1

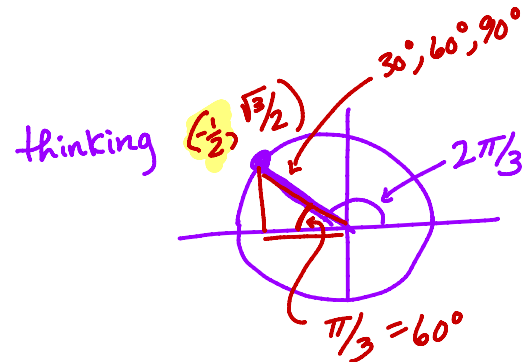
thinking



b. $\cos(2\pi/3) =$

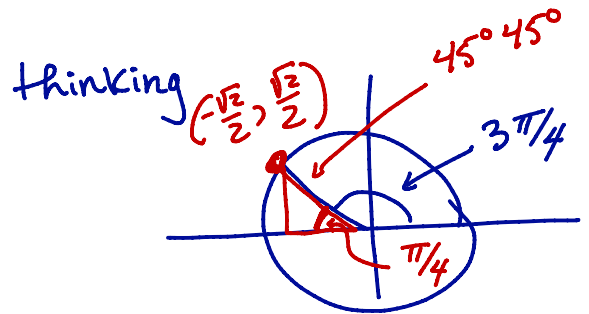
$-\frac{1}{2}$

thinking



c. $\tan(3\pi/4) =$

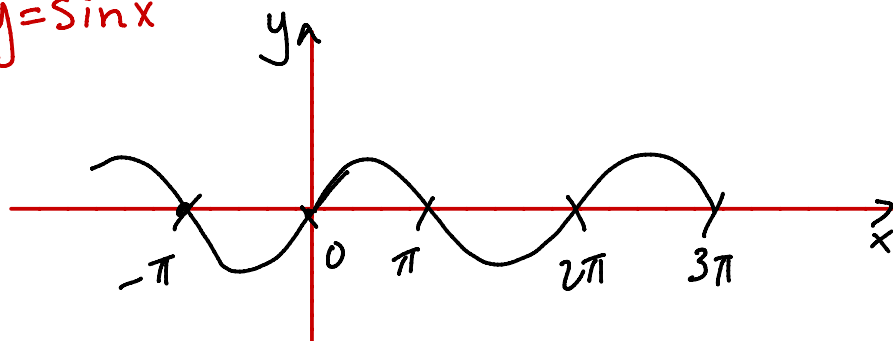
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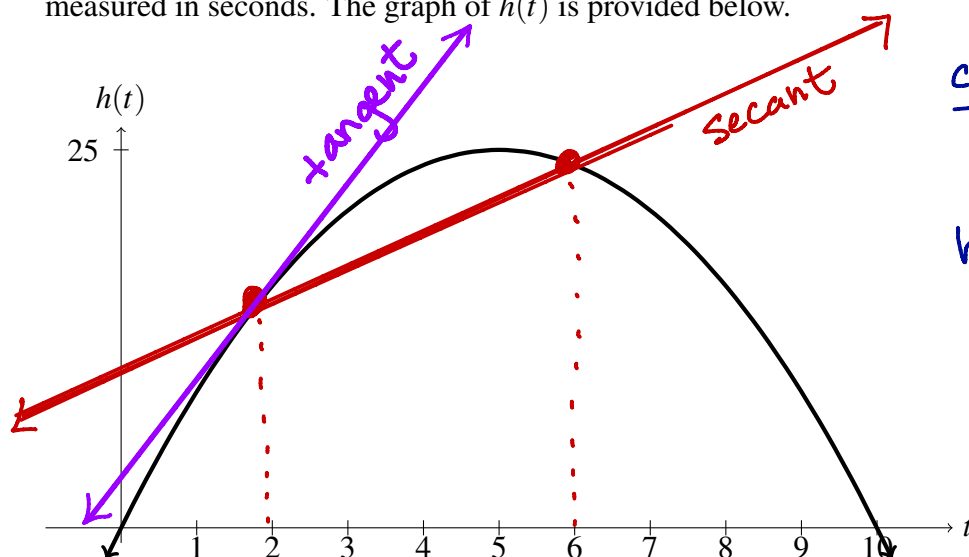
2. [4 points] Solve the equation $\sin(x) = 0$. Give the most complete solution.

answer: $x = \dots, -\pi, 0, \pi, 2\pi, \dots = \pi k$, k is an integer

thinking: $y = \sin x$



3. [15 points] The height of an object in meters is given by the equation $h(t) = 10t - t^2$ where t is measured in seconds. The graph of $h(t)$ is provided below.



computational work

$$h(2) = 10 \cdot 2 - 2^2 = 16$$

$$h(6) = 10 \cdot 6 - 6^2 = 24$$

- a. Find $h(2)$ and explain (using a complete sentence) what this number represents in the context of the problem. Include units.

$$h(2) = 16 \text{ m.}$$

After 2 seconds have passed, the object is 16 meters high.

- b. Find the average velocity of the object over the time interval from $t = 2$ to $t = 6$. Include units with your answer.

$$\text{avg. vel.} = \frac{h(6) - h(2)}{6 - 2} = \frac{24 - 16}{4} = \frac{8}{4} = 2 \text{ m/s}$$

- c. On the graph above, draw and label the secant line between the points $P(2, h(2))$ and $Q(6, h(6))$. (By **label**, we mean label with the word **secant**.)
- d. On the graph above, draw and label the tangent line at the point $P(2, h(2))$. (By **label**, we mean label with the word **tangent**.)
- e. Based on the graph and the lines you drew in parts c and d, do you expect the slope of the tangent line to $h(x)$ at P to be larger than, equal to, or smaller than the slope of the secant line between points P and Q ? Explain your reasoning using complete sentences.

The slope of the tangent should be larger than the slope of the secant because, in the picture, the tangent has a steeper slope than the secant.