

Math 131 - Quiz 6

March 4, 2026

Name key

Score _____

Show all work to receive full credit. Supply explanations when necessary.

1. (2 points) Compute the average rate of change of $f(t) = 2 + 3\sin t$ over the interval from $t = 0$ to $t = \pi/2$.

$$\frac{f\left(\frac{\pi}{2}\right) - f(0)}{\frac{\pi}{2} - 0} = \frac{(2+3) - (2)}{\frac{\pi}{2}} = \frac{3}{\frac{\pi}{2}} = \boxed{\frac{6}{\pi}}$$

2. (8 points) An object is launched upward so that its height, in feet, after t seconds is given by

$$s(t) = -16t^2 + 64t + 192.$$

For each part of this problem, be sure to give units with your answer.

- (a) What is the object's velocity at $t = 1$?

$$s'(t) = -32t + 64$$

$$\boxed{s'(1) = 32 \text{ FT/SEC}}$$

- (b) Find the maximum height of the object.

$$s'(t) = 0 \Rightarrow -32t + 64 = 0 \Rightarrow t = 2 \text{ sec}$$

$$s(2) = -16(4) + 64(2) + 192 = \boxed{256 \text{ FT}}$$

- (c) When does the object hit the ground?

$$s(t) = 0 \Rightarrow -16t^2 + 64t + 192 = 0 \quad -16(t+2)(t-6) = 0$$

$$-16(t^2 - 4t - 12) = 0$$

$$\cancel{t=2} \quad \boxed{t=6 \text{ sec}}$$

- (d) What is the speed of the object at the moment it hits the ground?

$$|v(6)| = |-32(6) + 64| = |-128| = 128$$

$$\boxed{128 \text{ FT/SEC}}$$

- (e) What is the object's acceleration at time t ?

$$s''(t) = v'(t) = a(t) = \boxed{-32 \text{ FT/SEC}^2}$$