3.7 Hw Solutions

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Question 1:

Solution: 😊

Part 1.) Find the derivative of h:

$$v(t) = h' = 25.5 - 9.8t.$$

Part 2.) Plug 2 and 4 into velocity function:

$$\begin{aligned} v(2) &= 25.5 - 9.8(2) \\ &= 5.9. \end{aligned}$$

$$\begin{aligned} v(4) &= 25.5 - 9.8(4) \\ &= -13.7. \end{aligned}$$

Part 3.) Set v(t) = 0 and solve for t

$$No\ work.$$

Part 4.) Plug answer from part 3 into h for t

$$No\ Work.$$

part 5.) Set h = 0 and solve using the quadratic formula

$$no\ work.$$

Part 6.) Plug answer from part 5 into v(t)

Question 2:

Solution: 😊

a.) find v(t), set equal to zero and then plug answer into h

$$no\ work.$$

b.) set h = 384 and solve using the quadratic fomula, then plug answers into v(t)

$$no\ work.$$

Question 3:

Solution: 😊

Part a.) Find v(t), set equal to 25, factor and solve for t

Note:-

we don't care about negative time

Part b.) Find a(t) and set = 0

Note:-

Again, don't care about negative time

Question 4:

Solution: ☺

$$A = \pi r^2.$$

a.i)

$$\begin{aligned} & \frac{a(5) - a(4)}{5-4} \\ = & \frac{\pi(5)^2 - \pi(4)^2}{5-4} \\ = & \frac{25\pi - 16\pi}{1} \\ = & \boxed{9\pi}. \end{aligned}$$

Part b.)

$$\begin{aligned} A(r) &= \pi r^2 \\ A'(r) &= 2\pi r \\ A'(4) &= 2\pi(4) \\ &= \boxed{8\pi}. \end{aligned}$$

Question 5:

Solution: ☺

$$\begin{aligned} S &= 4\pi r^2 \\ S' &= 8\pi r. \end{aligned}$$

a.)

$$\begin{aligned} S(4) &= 8\pi(4) \\ &= 32\pi. \end{aligned}$$

b.)

$$\begin{aligned} S(5) &= 8\pi(5) \\ &= 40\pi. \end{aligned}$$

Question 6:

Solution: ☺

If:

$$V = 5500(1 - \frac{1}{50}t)^2.$$

Then:

$$V' = 11000(1 - \frac{1}{50}t) \cdot -\frac{1}{50}.$$

5 min:

$$\begin{aligned} V'(5) &= 11000(1 - \frac{1}{50}(5)) \cdot -\frac{1}{50} \\ &= -198. \end{aligned}$$

Flowing the fastest:

$$0 \ min.$$

Flowing the slowest:

$$50 \ min.$$

Note:-

remember the interval is $0 \leqslant t \leqslant 50$, water does not start flowing out at 5 minutes, it starts at 0

Question 7:

Solution: ☺

$$D(t) = 7 + 5\cos\left[0.503(t - 6.75)\right].$$

$$\begin{aligned} D'(t) &= 0 + 5(-\sin\left(0.503(t - 6.75)\right)) \cdot (0.503(1 - 0)) \\ &= 5(-\sin\left(0.503(t - 6.75)\right)) \cdot 0.503 \\ &= 5(-\sin\left(0.503t - 3.39525\right)) \cdot 0.503 \\ &= 5(-0.503\sin\left(0.503t - 3.39525\right)) \\ &= -2.515\sin\left(0.503t - 3.39525\right) \end{aligned}$$

.

a-d.)

$$\begin{aligned} D(2) &= -2.515\sin\left(0.503(2) - 3.39525\right) \\ &= 1.72. \end{aligned}$$

Question 8:

Solution: ☺

$$n(t) = 600 \cdot 3^t.$$

b.) Find $n'(t)$

If:

$$\frac{d}{dx}a^x = a^x \cdot \ln x.$$

And:

$$n(t) = 600 \cdot 3^t.$$

Then:

$$n'(t) = 600 \cdot 3^t \cdot \ln 3.$$

So:

$$\begin{aligned} n'(1.5) &= 600 \cdot 3^{1.5} \cdot \ln 3 \\ &= 3425 \end{aligned}$$

Question 9:

Solution: 😊

no work.

Question 10:

Solution: 😊

no work.