WA 1

(1) #2.

3/3

Δt	ARC
1	-3
0.5	-3
0.1	-3
0.01	-3

+1 for filling table, or finding these values.

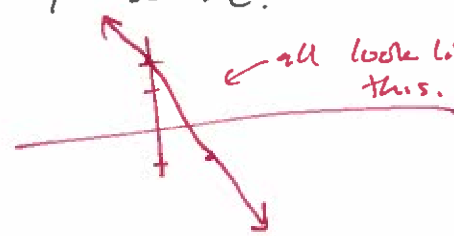
#8. All secant lines agree w/ original function!

$$y = 2 - 3t.$$

+1 (ok if they just did one, as long as there is an explanation that they're all the same)

#14. Slopes of secant lines limit to -3, and the tangent line is still $y = 2 - 3t$.

+1



all look like this.

(2) #6.

3/3

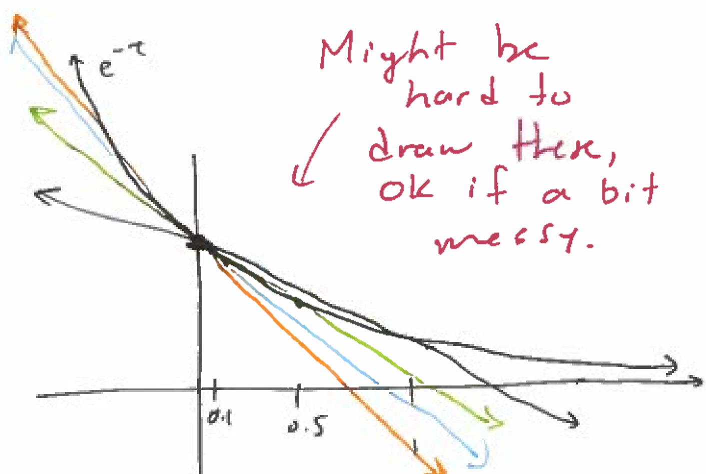
Δt	ARC
1	-0.632
0.5	-0.787
0.1	-0.952
0.01	-0.995

+1 for values

#8.

Δt	Secant line
1	$\boxed{y = -0.632t + 1}$
0.5	$\boxed{y = -0.787t + 1}$
0.1	$\boxed{y = -0.952t + 1}$
0.01	$y = -0.995t + 1$

+1



Might be hard to draw there, ok if a bit messy.

#18 Seems like slopes limit to -1!

Tangent line: $\boxed{y = -t + 1}$.

+1 ok if they use decimal close to -1.

(3) The derivative at a point is the slope of the tangent line. +1 as long as what they write is true.

3/3

Examples: * derivative of position is velocity.

* derivative of velocity is acceleration.

* derivative of population is the population growth rate.

* derivative of total income is your hourly wage.

all with respect to time

* Other examples ok if valid.

+1 for each example, total of +2.

$\frac{4}{}$

3/3

Problem 4: $h(r) = 2.3 + 6r^3$ at $r=4$.

$$\left.\frac{dh}{dr}\right|_{r=4} \approx \frac{h(4+0.0001)-h(4)}{0.0001} \approx 288.007.$$

slope $= 288.007$ (+1)

y-int: $y = 288.007\, r + b$ use point $(4, 386.3)$

$$386.3 = (288.007)(4) + b$$

$$b \approx -765.728$$ (+1)

Tangent line: $y \approx 288.007\, r - 765.728.$

Problem 5: $s(t) = 3\sin(t).$

$$\left.\frac{ds}{dt}\right|_{\pi/2} \approx \frac{3\sin\left(\frac{\pi}{2}+0.00001\right) - 3\sin(\pi/2)}{0.00001}$$

$$\approx -0.000015$$

or close. (+1)

Guess: $\left.\frac{ds}{dt}\right|_{\pi/2} = 0$. Can also see using the graph!

(5)

2/2

x	$\frac{\sin x}{x}$
1	0.8415
0.1	0.9983
0.01	0.99998
0.001	0.99999
0.0001	≈ 1

easily notice these numbers get close to 1.

$$\Rightarrow \lim_{x \to 0} \frac{\sin(x)}{x} = 1.$$

(+2) for getting close to 1.
If just ~~one~~ or two values for x are used, −1.

(6)

4/4

21: $\lim_{x \to 1^-} f(x) = 1$

$\lim_{x \to 1^+} f(x) = 1$

$\boxed{+0.5 \text{ each}}$

22: Both are equal to 1. (+1)

23: $\lim_{x \to 1^-} y = 0.1$

$\lim_{x \to 1^+} y = 0.002$ ish.

$\boxed{+0.5 \text{ each}}$

24 $\lim_{x \to 1^-} f(x) = 0$

$\lim_{x \to 1^+} f(x) = 2.$

$\boxed{+0.5 \text{ each}}$

⑦ ~~ARC~~ $ARC(\Delta x) = \dfrac{f(1+\Delta x) - f(1)}{\Delta x}$

2/2

$$= \frac{5(1+\Delta x)^2 - 5}{\Delta x}$$

$$= \frac{5(1+2\Delta x+(\Delta x)^2) - 5}{\Delta x}$$

$$= \frac{10\Delta x + 5(\Delta x)^2}{\Delta x}$$

$$\Rightarrow \lim_{\Delta x \to 0} \frac{\Delta f}{\Delta x} = \lim_{\Delta x \to 0} \frac{10\Delta x + 5(\Delta x)^2}{\Delta x}$$

$$= \lim_{\Delta x \to 0} (10 + 5\Delta x) = \boxed{10.}$$

+2.

★ OK if they use a decimal approximation as long as it isn't found by single value of Δx.