

1.

TI-84 Plus calculator screen showing a piecewise function definition:

$$r(t) := \begin{cases} \frac{600 \cdot t}{t+3}, & 0 \leq t \leq 5 \\ 1000 \cdot e^{-0.2 \cdot t}, & t > 5 \end{cases}$$

the peicwise function can be found in the template button between the 9 and the library.

a.

TI-84 Plus calculator screen showing limit calculations:

Continuous: Show  
1) limit exists

$$\lim_{t \rightarrow 5^-} (r(t)) = 375.$$

the limit does not exist because the left and right side do not agree

$$\lim_{t \rightarrow 5^+} (r(t)) = 367.879$$

b.

TI-84 Plus calculator screen showing an average value calculation:

$$\frac{1}{8-0} \int_0^8 r(t) dt = 258.053$$

258.05274

given rate, want average rate use

$$\frac{1}{b-a} \int_a^b \text{rate} dt$$

c.

TI-84 Plus calculator screen showing a derivative calculation:

$$\frac{d}{dt}(r(t))|_{t=3} = 50.$$

units (liters/hour)/hour = liters/hr<sup>2</sup>

the rate the water is draining is increasing (because positive derivative tells me the function (r) is increasing at t=8)

d.

TI-84 Plus calculator screen showing an integral equation:

Amount of water at (t=A) = amount of water at the beginning - amount of water drained from (t=0 to end time t=A)

$$9000 = 12000 - \int_0^A r(t) dt$$

2.

a.

1.4 1.5 2.1 \*Unsaved

acceleration is the derivative (slope) of velocity

$$a(7.5) = v'(7.5) = \frac{v(8) - v(7)}{8 - 7} \text{ mil/min}^2$$

$$\frac{0.2 - 0.3}{8 - 7} \quad -0.1$$

b.

1.5 2.1 2.2 \*Unsaved

the integral is the TOTAL distance (sign is irrelevant) Caren so we need to break up the area into chunks from 0 to 2, 2 to 4, 5 to 6, 6 to 7, (first line)  
7 to 8, 8 to 11, 11 to 12. (second line)

$$\frac{1}{2} \cdot 2 \cdot 0.2 + \frac{1}{2} \cdot 2 \cdot 0.2 + \frac{1}{2} \cdot 1 \cdot 0.3 + 1 \cdot 0.3$$

0.85

$$\frac{0.3 + 0.2}{2} \cdot 1 + 3 \cdot 0.2 + \frac{1}{2} \cdot 1 \cdot 0.2$$

0.95

$$0.85 + 0.95 \quad 1.8$$

c. Changes in direction happen when velocity = 0 and changes sign, this occurs at t=2. (shes goes from positive velocity to negative meaning she went back home). She also changed directions at t=4 but since she went from negative to positive that means she went from home to school, the questions only asks for t=2

d.

2.1 2.2 2.3 \*Unsaved

$$w(t) = \frac{\pi}{15} \cdot \sin\left(\frac{\pi}{12} \cdot t\right)$$

Done

$$\int_0^{12} w(t) dt \quad 1.6$$

Carens distance is the same as (b) but with signs included to the first two triangles sum to zero and we only add the area from 5 to 12 which is 1.4

3. Have to check critical points and endpoints for highest value

2.2 2.3 2.4 \*Unsaved

$f(x) := \frac{5}{3} \cdot x^3 - x^2 - 7 \cdot x$  Done

$\text{solve}\left(\frac{d}{dx}(f(x))=0, x\right)$   $x=-1$  or  $x=\frac{7}{5}$

$f(-2)$   $-\frac{10}{3}$

$f(-1)$   $\frac{13}{3}$

$f\left(\frac{7}{5}\right)$   $-\frac{539}{75}$

$f(2)$   $-\frac{14}{3}$

- 4.

2.3 2.4 3.1 \*Unsaved

$f(x) := \int_0^x (t^3 + t) dt$  Done

$f(4) - f(1)$  71.25

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- 5.

2.4 3.1 4.1 \*Unsaved

average value of f

$\frac{1}{b-a} \int_a^b f(x) dx$

$\frac{1}{3-(-1)} \int_{-1}^3 (3 \cdot x - 1)^3 dx$  80

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