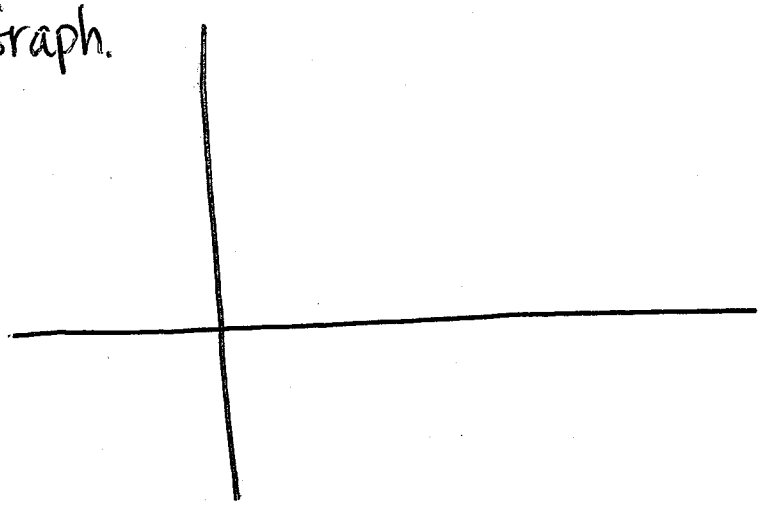
Practice Test

① Use 5 right hand rectangles to approximate $\int_3^4 \sqrt{x} + 1 \, dx$
Round your final answer to 2 decimal places.

a) Find Area.

b) Graph.



c) Use Sigma Notation to represent the area.

② Barb pulled the plug on her bubble bath and the water started to drain. The amount of water in the bath tub as it drains is represented by the equation $f(x) = -5x^2 + 33x + 14$.

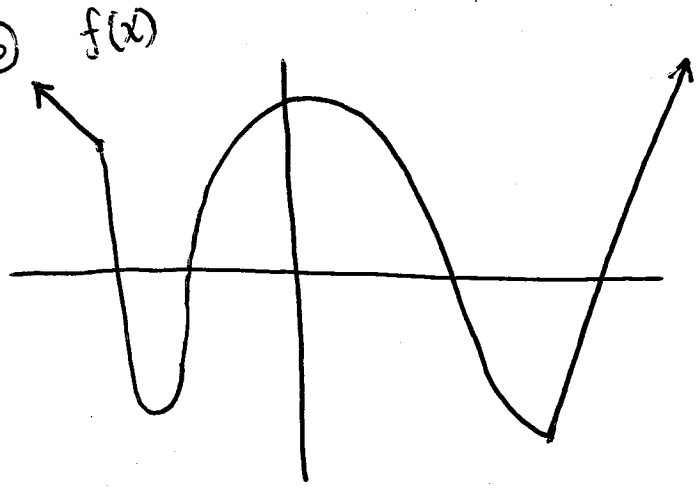
Determine the speed at the exact moment the tub was completely drained.
($f(x)$ represents gallons of water remaining, x represents time in minutes.)

③ Given $f(x) = 2x^2 + 8x - 3$, find the equation of the tangent line at $x = 3$.

④ Given $h(3) = 6$, $h'(3) = -2$, find the equation of the tangent line at $x = 3$.

⑤ At what values, does the function $g(x) = \frac{3}{x+4}$ have a slope of $-\frac{1}{3}$

⑥



a. Sketch the derivative

b. Find when $f'(x) > 0$ (use interval notation)

c. Find when $f'(x) < 0$

d. when if $f'(x)$ the greatest value?

⑦ Find the interval when the following graph is continuous.

$$g(x) = \frac{(x+1)(\sqrt{2x+1})}{x^2-1}$$

⑧ Find variables a and b to make the function continuous.

$$g(x) = \begin{cases} ax+b & x>3 \\ x^2+b-a-1 & 3 \leq x < 7 \\ x+43 & x \geq 7 \end{cases}$$

⑨ Find all limits (solve algebraically when possible)

ⓐ $\lim_{x \to 5} \frac{5x+1}{x+5}$

ⓑ $\lim_{x \to -\infty} \frac{5x^3+2x^2+1}{x^2-x^3}$

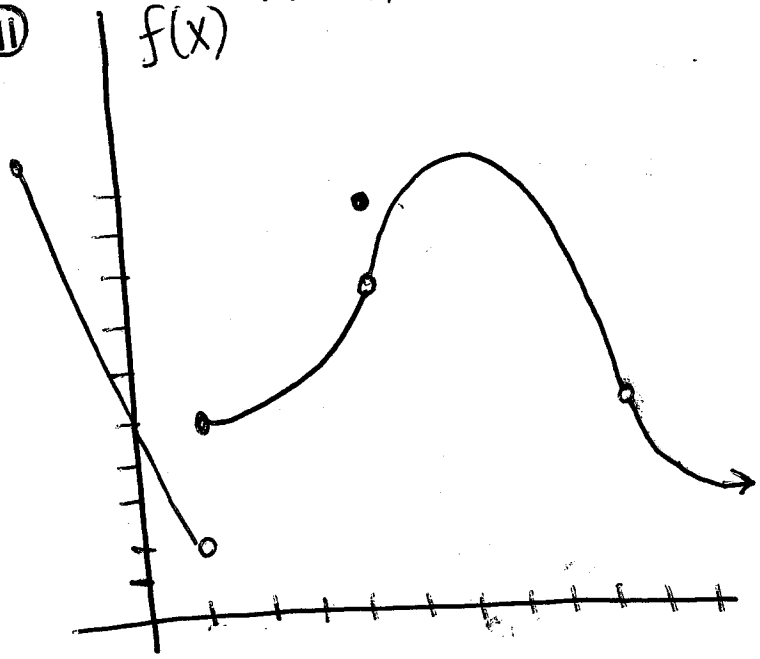
ⓒ $\lim_{x \to 16^-} \frac{(4-\sqrt{x})(16-x)}{x^2-32x+256}$

ⓓ $\lim_{x \to -3} \frac{5x^3+15x^2-3x-9}{x^2-9}$

⑩ Using the definition of derivative, find the derivative of

$\frac{1}{5}\sqrt{2x-3}$

⑪ Identify continuous or discontinuous. If discontinuous, state type and reason it's not continuous.



$\lim_{x \to 1} =$

$\lim_{x \to 1^-} =$

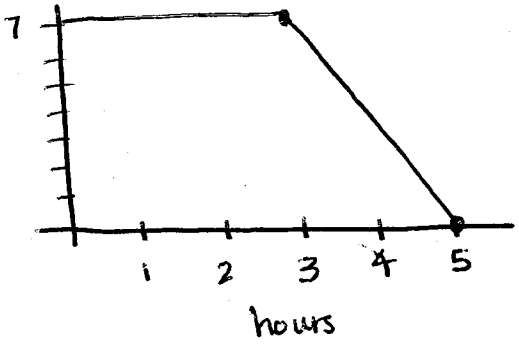
$\lim_{x \to 1^+} =$

$\lim_{x \to 4} =$

$\lim_{x \to 9} =$

$\lim_{x \to a} =$

⑫ The speed Ms. Shultis runs a race is demonstrated below. Find the total distance she traveled.



⑬ Sketch a graph with all the following.

- $\lim_{x \to -\infty} f(x) = -3$
- $f'(x) > 0$ only on the interval $(-2,4)$
- $f(1)$ is undefined
- Non removable discontinuity at $x=4$
- $f(x) < 0$ & constant only when $x > 4$