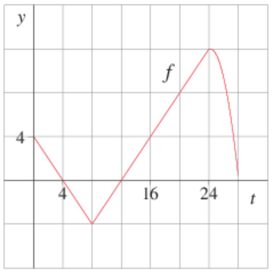
Q1

Thursday, November 12, 2020 4:25 PM

Let $g(x) = \int_0^x f(t)\,dt$, where f is the function whose graph is shown.

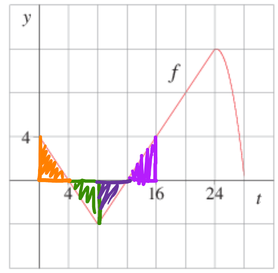
$g(0) = \int_0^0 f(t)\,dt$

$= \boxed{0}$



$g(16) = \int_0^{16} f(t)\,dt$

$= \boxed{0}$

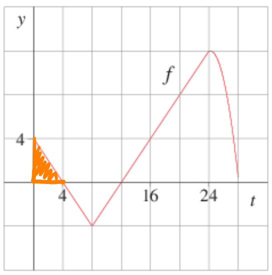


$g(0) =$	0	✔
$g(4) =$	8	✔
$g(8) =$	0	✔
$g(12) =$	-8	✔
$g(16) =$	0	✔
$g(20) =$	24	✔
$g(24) =$	64	✔

$g(4) = \int_0^4 f(t)\,dt$

$= \frac{1}{2}(4)(4)$

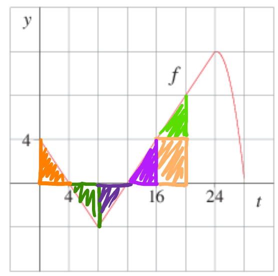
$= \boxed{8}$



$g(20) = \int_0^{20} f(t)\,dt$

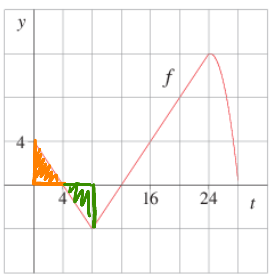
$= (4)(4) + \frac{1}{2}(4)(4)$

$= \boxed{24}$



$g(8) = \int_0^8 f(t)\,dt$

$= \boxed{0}$

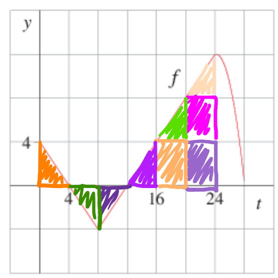


$g(20) = \int_0^{20} f(t)\,dt$

$= (4)(4) + \frac{1}{2}(4)(4)$

$+ (4)(4) + (4)(4) + \frac{1}{2}(4)(4)$

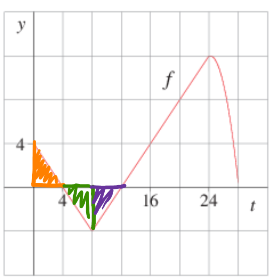
$= \boxed{64}$



$g(12) = \int_0^{12} f(t)\,dt$

$= -\frac{1}{2}(4)(4)$

$= \boxed{-8}$



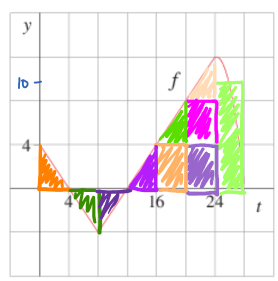
$g(20) = \int_0^{20} f(t)\,dt$

$= (4)(4) + \frac{1}{2}(4)(4)$

$+ (4)(4) + (4)(4) + \frac{1}{2}(4)(4)$

$+ (4)(10)$

$= \boxed{104}$



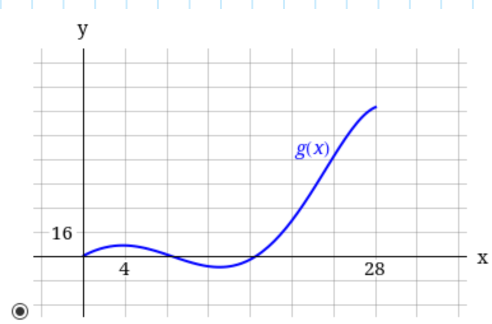
(b) Estimate $g(28)$. (Use the midpoint to get the most precise estimate.)

$g(28) =$ 104 ✔

(c) Where does g have a maximum and a minimum value?

minimum $x =$ 12 ✔

maximum $x =$ 28 ✔



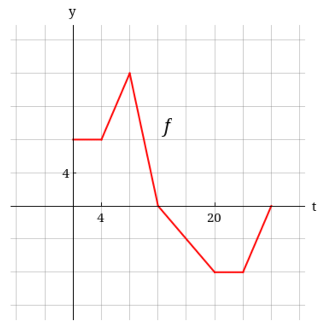
Q2

Friday, November 13, 2020 2:39 PM

Let $g(x) = \int_0^x f(t)\,dt$, where f is the function whose graph is shown.

$g(0) = \int_0^0 f(t)\,dt$

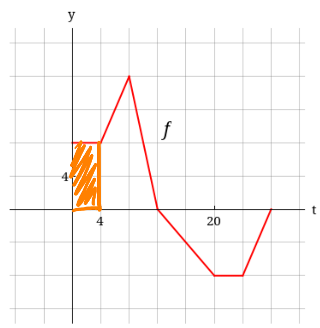
$= \boxed{0}$



$g(4) = \int_0^4 f(t)\,dt$

$= (4)(8)$

$= \boxed{32}$

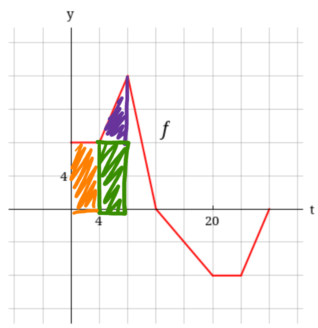


$g(8) = \int_0^8 f(t)\,dt$

$= \square \times 2 + \triangle$

$= 2[(4)(8)] + \frac{1}{2}(4)(8)$

$= \boxed{80}$



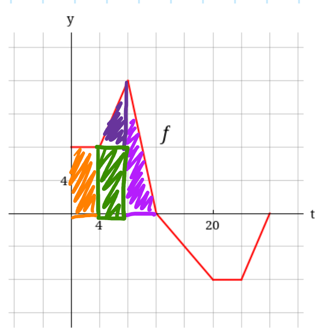
$g(12) = \int_0^{12} f(t)\,dt$

$= \square \times 2 + \triangle + \triangle$

$= 2[(4)(8)] + \frac{1}{2}(4)(8)$

$+ \frac{1}{2}(4)(16)$

$= \boxed{112}$



$g(24) = \int_0^{24} f(t)\,dt$

$= \square \times 2 + \triangle + \triangle$

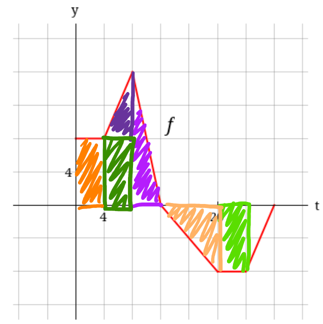
$- \triangle - \square$

$= 2[(4)(8)] + \frac{1}{2}(4)(8)$

$+ \frac{1}{2}(4)(16) - \frac{1}{2}(8)(8)$

$- (4)(8)$

$= \boxed{48}$



(a) Evaluate $g(0)$, $g(4)$, $g(8)$, $g(12)$, and $g(24)$.

$g(0) =$ 0 ✓ +

$g(4) =$ 32 ✓ +

$g(8) =$ 80 ✓ +

$g(12) =$ 112 ✓ +

$g(24) =$ 48 ✓ −

increasing

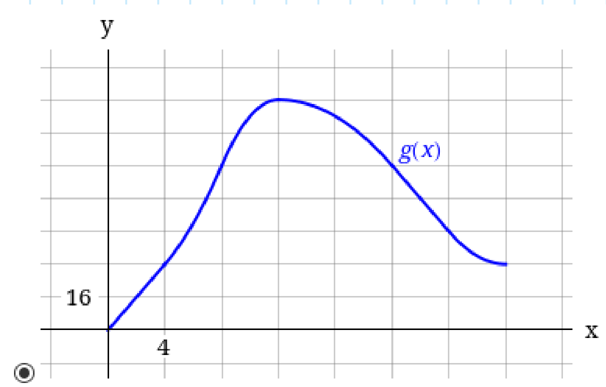
(b) On what interval is g increasing? (Enter your answer using interval notation.)

$(0, 12)$ ✓

(c) Where does g have a maximum value?

$x =$ 12 ✓

(d) Sketch a rough graph of g.



Q3

Friday, November 13, 2020 3:45 PM

Use Part 1 of the Fundamental Theorem of Calculus to find the derivative of the function.

$$g(x) = \int_0^x \sqrt{t^3 + t^5}\, dt$$

$g'(x) = \boxed{\sqrt{x^3 + x^5}}$ ✓

$$g(x) = \int_0^x \sqrt{t^3+t^5}\, dt$$

Let $f(t) = \sqrt{t^3 + t^5}$

$g'(x) = f(x) = \boxed{\sqrt{x^3 + x^5}}$

The Fundamental Theorem of Calculus Suppose f is continuous on $[a, b]$.

1. If $g(x) = \int_a^x f(t)\, dt$, then $g'(x) = f(x)$.
2. $\int_a^b f(x)\, dx = F(b) - F(a)$, where F is any antiderivative of f, that is, $F' = f$.

Q4

Friday, November 13, 2020 3:53 PM

Use Part 1 of the Fundamental Theorem of Calculus to find the derivative of the function.

$$g(s) = \int_7^s (t - t^4)^2 dt$$

$g'(s) = \boxed{(s - s^4)^2}$

$$g(s) = \int_7^s (t - t^4)^2 dt \qquad \text{let } f(t) = (t - t^4)^2$$

$$g'(s) = f(s) = \boxed{(s - s^4)^2}$$

Q5

Friday, November 13, 2020   3:56 PM

Evaluate the integral.

$$\int_4^6 (x^2 + 2x - 4)\, dx$$

$\frac{188}{3}$ ✓

The Fundamental Theorem of Calculus Suppose f is continuous on $[a, b]$.

1. If $g(x) = \int_a^x f(t)\, dt$, then $g'(x) = f(x)$.
2. $\int_a^b f(x)\, dx = F(b) - F(a)$, where F is any antiderivative of f, that is, $F' = f$.

$$\int_4^6 (x^2 + 2x - 4)\, dx = \left[\frac{x^{2+1}}{2+1} + \frac{2x^{1+1}}{1+1} - 4x \right]_4^6$$

$$= \left[\frac{x^3}{3} + x^2 - 4x \right]_4^6$$

$$= F(6) - F(4)$$

$$= \left(\frac{6^3}{3} + 6^2 - 4(6) \right) - \left(\frac{4^3}{3} + 4^2 - 4(4) \right)$$

$$= \boxed{\frac{188}{3}}$$

Q6

Friday, November 13, 2020 8:10 PM

Evaluate the integral.

$$\int_0^4 \left(\frac{4}{5}t^3 - \frac{3}{4}t^2 + \frac{2}{5}t\right) dt$$

$\frac{192}{5}$ ✓

$$\int_0^4 \left(\frac{4}{5}t^3 - \frac{3}{4}t^2 + \frac{2}{5}t\right) dt = \left[\frac{4}{5}\frac{1}{3+1}t^{3+1} - \frac{3}{12}\frac{1}{2+1}t^{2+1} + \frac{2}{5}\frac{1}{1+1}t^{1+1}\right]_0^4$$

$$= \left[\frac{4}{20}t^4 - \frac{3}{12}t^3 + \frac{2}{10}t^2\right]_0^4$$

$$= \left[\frac{1}{5}t^4 - \frac{1}{4}t^3 + \frac{1}{5}t^2\right]_0^4$$

$$= F(4) - F(0)$$

$$= \left(\frac{1}{5}(4)^4 - \frac{1}{4}(4)^3 + \frac{1}{5}(4)^2\right) - \left(\frac{1}{5}(0)^4 - \frac{1}{4}(0)^3 + \frac{1}{5}(0)^2\right)$$

$$= \boxed{\frac{192}{5}}$$

Q7

Friday, November 13, 2020 8:18 PM

Evaluate the integral.

$$\int_4^9 \sqrt{x}\, dx$$

$\frac{38}{3}$

$$\int_4^9 \sqrt{x}\, dx = \int_4^9 x^{1/2}\, dx = \left[\frac{x^{1/2+1}}{\frac{1}{2}+1} \right]_4^9$$

$$= \left[\frac{2}{3} x^{3/2} \right]_4^9$$

$$= F(9) - F(4)$$

$$= \left(\frac{2}{3} 9^{3/2}\right) - \left(\frac{2}{3} 4^{3/2}\right)$$

$$= \boxed{\frac{38}{3}}$$

Q8

Friday, November 13, 2020 8:25 PM

Evaluate the integral.

$$\int_1^9 \frac{4 + x^2}{\sqrt{x}}\, dx$$

$\frac{564}{5}$

$$\int_1^9 \frac{4+x^2}{\sqrt{x}}\,dx = \int_1^9 4x^{-1/2} + x^{3/2}\,dx = \left[\frac{4x^{-1/2+1}}{-\frac{1}{2}+1} + \frac{x^{3/2+1}}{\frac{3}{2}+1}\right]_1^9$$

$$= \left[\frac{2}{1}4x^{1/2} + \frac{2}{5}x^{5/2}\right]_1^9$$

$$= \left[8x^{1/2} + \frac{2}{5}x^{5/2}\right]_1^9$$

$$= F(9) - F(1)$$

$$= \left[8(9)^{1/2} + \frac{2}{5}(9)^{5/2}\right] - \left[8(1)^{1/2} + \frac{2}{5}(1)^{5/2}\right]$$

$$= \boxed{\frac{564}{5}}$$

Q9

Friday, November 13, 2020 8:50 PM

Evaluate the integral.

$$\int_1^2 \frac{v^5 + 4v^7}{v^4}\, dv$$

$$\frac{33}{2}$$

$$\int_1^2 \frac{v^5+4v^7}{v^4}\,dv = \int_1^2 v + 4v^3 = \left[\frac{v^{1+1}}{1+1} + \frac{4v^{3+1}}{3+1}\right]_1^2$$

$$= \left[\frac{v^2}{2} + v^4\right]_1^2$$

$$= F(2) - F(1)$$

$$= \left(\frac{2^2}{2} + 2^4\right) - \left(\frac{1^2}{2} + 1^4\right)$$

$$= \boxed{\frac{33}{2}}$$

Q10

Friday, November 13, 2020 8:55 PM

Evaluate the integral.

$$\int_0^1 (7x^e + 5e^x)\,dx$$

$$\frac{7}{e+1} + 5e - 5$$

$$\int_0^1 (7x^e + 5e^x)\,dx = \left[\frac{7x^{e+1}}{e+1} + 5e^x\right]_0^1$$

$$= F(1) - F(0)$$

$$= \left(\frac{7(1)^{e+1}}{e+1} + 5e^1\right) - \left(\frac{7(0)^{e+1}}{e+1} + 5e^0\right)$$

$$= \boxed{\frac{7}{e+1} + 5e - 5}$$

Q11

Friday, November 13, 2020 9:03 PM

Evaluate the integral.

$$\int_{1/\sqrt{3}}^{\sqrt{3}} \frac{7}{1+x^2}\,dx$$

$\frac{7\pi}{6}$

$$\int_{1/\sqrt{3}}^{\sqrt{3}} \frac{7}{1+x^2}\,dx = \Big[7\tan^{-1}x\Big]_{1/\sqrt{3}}^{\sqrt{3}} \qquad \frac{d}{dx}\left(\tan^{-1}x\right) = \frac{1}{1+x^2}$$

$$= F(\sqrt{3}) - F\left(\tfrac{1}{\sqrt{3}}\right)$$

$$= 7\tan^{-1}\sqrt{3} - 7\tan^{-1}\frac{1}{\sqrt{3}}$$

$$= 7\left(\frac{\pi}{3} - \frac{\pi}{6}\right)$$

$$= \boxed{\frac{7\pi}{6}}$$

Q12

Friday, November 13, 2020 9:30 PM

Sketch the region enclosed by the given curves. (A graphing calculator is recommended.)

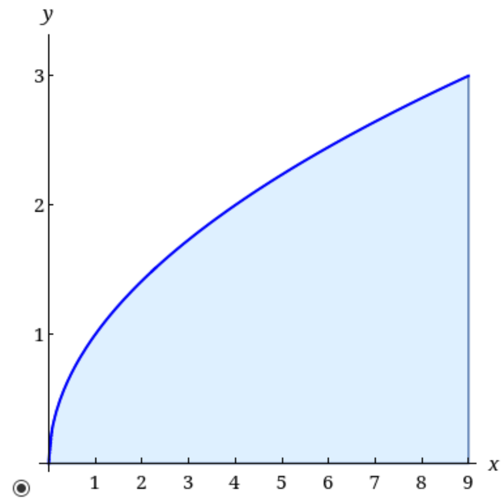
$y = \sqrt{x}, \quad y = 0, \quad x = 9$

$$\int_0^9 \sqrt{x} = \int_0^9 x^{1/2} = \left[\frac{2}{3}x^{3/2}\right]_0^9$$

$$= F(9) - F(0)$$

$$= \left(\frac{2}{3}9^{3/2}\right) - \left(\frac{2}{3}0^{3/2}\right)$$

$$= \boxed{18}$$



Calculate its area.

18

Q13

Friday, November 13, 2020 9:25 PM

Sketch the region enclosed by the given curves. (A graphing calculator is recommended.)

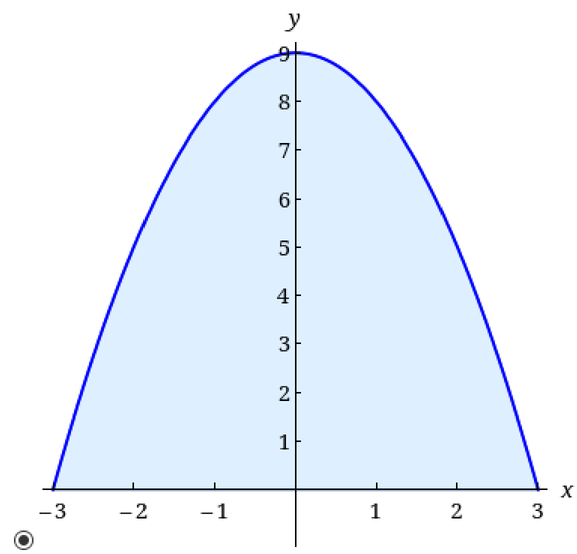
$y = 9 - x^2, \quad y = 0$

$$\int_{-3}^{3} (9 - x^2)\,dx = \left[9x - \frac{x^3}{3}\right]_{-3}^{3}$$

$$= F(3) - F(-3)$$

$$= \left(9(3) - \frac{3^3}{3}\right) - \left(9(-3) - \frac{-3^3}{3}\right)$$

$$= \boxed{36}$$



Calculate its area.

36