This print-out should have 32 questions. Multiple-choice questions may continue on the next column or page – find all choices before answering.

001 10.0 points

Find all functions g such that

$$g'(x) = \frac{x^2 + 3x + 4}{\sqrt{x}}.$$

1. $g(x) = 2\sqrt{x}\left(x^2 + 3x - 4\right) + C$

2. $g(x) = 2\sqrt{x}\left(\frac{1}{5}x^2 + x + 4\right) + C$

3. $g(x) = 2\sqrt{x}\left(x^2 + 3x + 4\right) + C$

4. $g(x) = \sqrt{x}\left(x^2 + 3x + 4\right) + C$

5. $g(x) = \sqrt{x}\left(\frac{1}{5}x^2 + x + 4\right) + C$

6. $g(x) = 2\sqrt{x}\left(\frac{1}{5}x^2 + x - 4\right) + C$

002 10.0 points

Determine $f(t)$ when

$$f''(t) = 2(6t + 1)$$

and

$$f'(1) = 6, \quad f(1) = 4.$$

1. $f(t) = 6t^3 - 2t^2 + 2t - 2$

2. $f(t) = 6t^3 + t^2 - 2t - 1$

3. $f(t) = 2t^3 - t^2 + 2t + 1$

4. $f(t) = 6t^3 + 2t^2 - 2t - 2$

5. $f(t) = 2t^3 + t^2 - 2t + 3$

6. $f(t) = 2t^3 - 2t^2 + 2t + 2$

003 10.0 points

Find the most general antiderivative, F, of the function

$$f(x) = 9x^2 - 14x + 6.$$

1. $F(x) = 3x^3 + 7x^2 + 6x$

2. $F(x) = 3x^3 - 7x^2 + 6x$

3. $F(x) = 3x^3 + 7x^2 + 6x + C$

4. $F(x) = 3x^3 - 7x^2 + 6x + C$

5. $F(x) = 9x^3 - 14x^2 + 6x + C$

004 10.0 points

Find the most general anti-derivative of the function

$$f(x) = 3\cos(x) - 4\sin(x).$$

1. none of these

2. $F(x) = 3\cos(x) + 4\sin(x) + C$

3. $F(x) = -3\sin(x) + 4\cos(x) + C$

4. $F(x) = 3\sin(x) + 4\cos(x) + C$

5. $F(x) = -3\cos(x) + 4\sin(x) + C$

005 10.0 points

Find $f(x)$ on $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$ when

$$f'(x) = 7 + 6\tan^2 x$$

and $f(0) = 5$.

1. $f(x) = 5 - x - 6\tan x$

2. $f(x) = -1 + 7x + 6\sec^2 x$

3. $f(x) = 5 + x + 6\tan^2 x$

4. $f(x) = -1 + 7x + 6\sec x$

5. $f(x) = 11 - x - 6\sec x$

6. $f(x) = 5 + x + 6\tan x$

---

006 10.0 points

Find $f(x)$ on $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$ when

$$f'(x) = 4\sqrt{2}\sin(x) + 3\sec^2(x)$$

and $f\left(\frac{\pi}{4}\right) = 2$.

1. $f(x) = 1 - 3\tan(x) + 4\sqrt{2}\sin(x)$

2. $f(x) = 9 - 3\tan(x) - 4\sqrt{2}\cos(x)$

3. $f(x) = 3\tan(x) - 4\sqrt{2}\cos(x) + 3$

4. $f(x) = 3\tan(x) + 4\sqrt{2}\sin(x) + 3$

5. $f(x) = 3\tan(x) + 4\sqrt{2}\cos(x) - 5$

---

007 10.0 points

Find the unique anti-derivative F of

$$f(x) = \frac{e^{4x} - 3e^{2x} + 5e^{-2x}}{e^{2x}}$$

for which $F(0) = 0$.

1. $F(x) = \frac{1}{4}e^{4x} + 3x + \frac{1}{2}e^{-2x} - 1$

2. $F(x) = \frac{1}{2}e^{2x} - 3x - \frac{1}{2}e^{-2x}$

3. $F(x) = \frac{1}{2}e^{2x} - 3x - \frac{5}{4}e^{-4x} + \frac{3}{4}$

4. $F(x) = \frac{1}{2}e^{2x} + 3x + \frac{5}{4}e^{-4x} - \frac{7}{4}$

5. $F(x) = \frac{1}{2}e^{2x} + 3x + \frac{5}{4}e^{-2x} - \frac{3}{4}$

6. $F(x) = \frac{1}{4}e^{4x} - 3x - \frac{5}{4}e^{-4x} - 1$

---

008 10.0 points

Find $f(x)$ when

$$f'(x) = 2\cos x - 9\sin x$$

and $f(0) = 5$.

1. $f(x) = -2\sin x + 9\cos x - 4$

2. $f(x) = -2\cos x + 9\sin x + 7$

3. $f(x) = 2\cos x + 9\sin x + 7$

4. $f(x) = 2\sin x + 9\cos x - 4$

5. $f(x) = 2\cos x + 9\sin x + 3$

6. $f(x) = 2\sin x + 9\cos x + 3$

---

009 10.0 points

Find the value of $f(1)$ when

$$f''(x) = 4\cos^2 x + 4\sin^2 x$$

and

$$f'(0) = -3, \quad f(0) = 5\,.$$

1. $f(1) = 5$

2. $f(1) = \frac{7}{2}$

3. $f(1) = 4$

4. $f(1) = 8 + 4(\sin 1)^2 - 4(\cos 1)^2$

5. $f(1) = \frac{9}{2}$

6. $f(1) = -2 + 4(\cos 1)^2$

7. $f(1) = -2 + 4(\sin 1)^2$

---

010 10.0 points

If the graph of f passes through the point $(1, 4)$ and the slope of the tangent line at $(x, f(x))$ is $8x - 5$, find the value of $f(2)$.

1. $f(2) = 9$

2. $f(2) = 7$

3. $f(2) = 11$

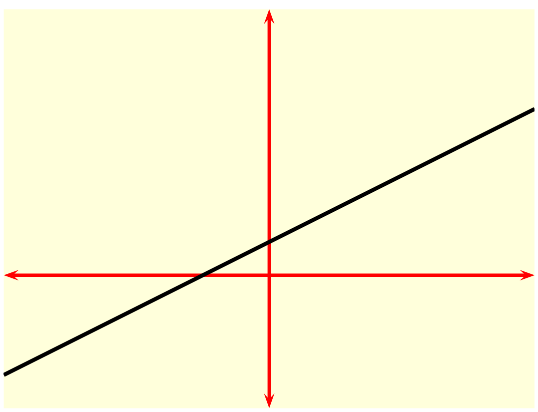
4. $f(2) = 8$

5. $f(2) = 10$

---

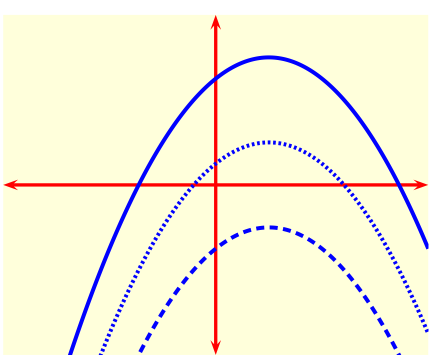
011 10.0 points

If the graph of f is

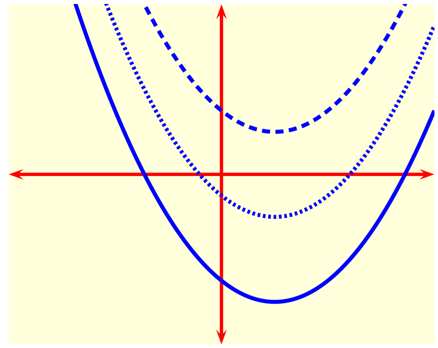


which one of the following contains only graphs of anti-derivatives of f?

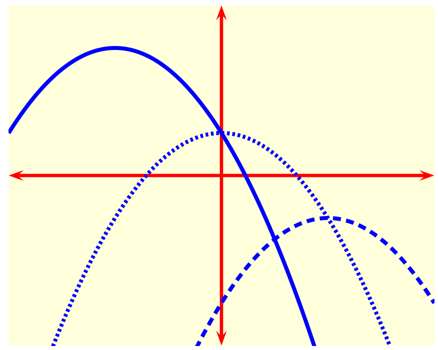
1.



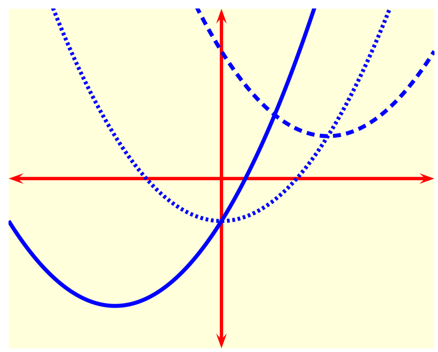
2.



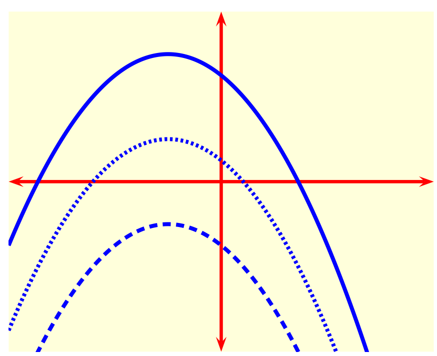
3.



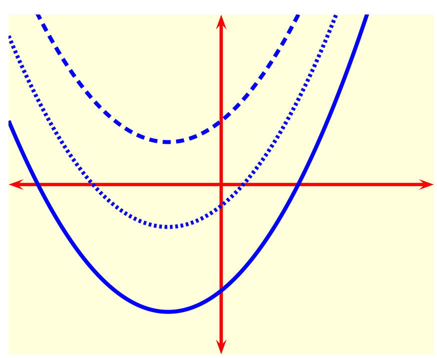
4.



5.



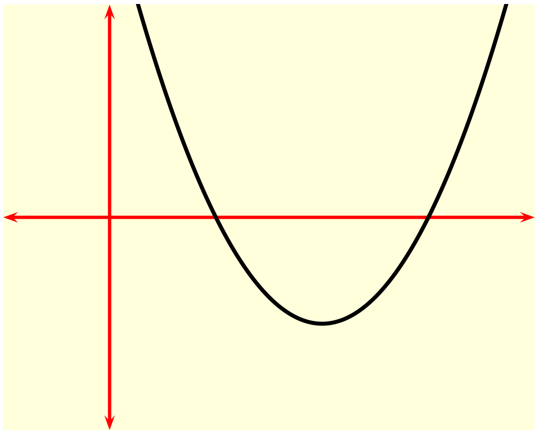
6.



---

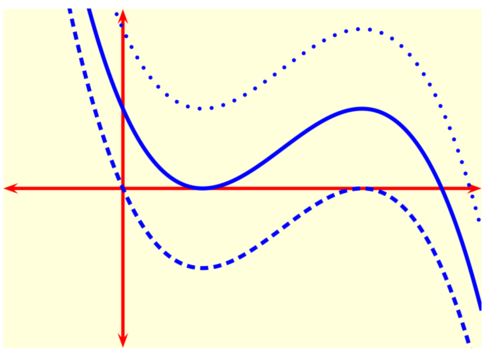
012 10.0 points

If the graph of f is

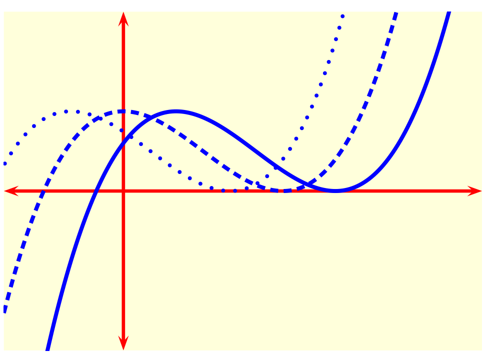


which one of the following contains only graphs of anti-derivatives of f?

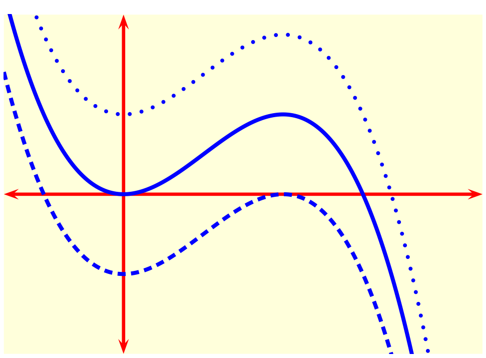
1.



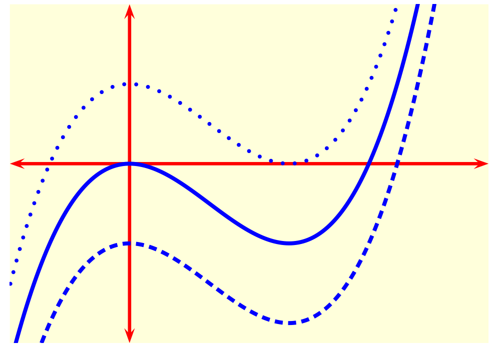
2.



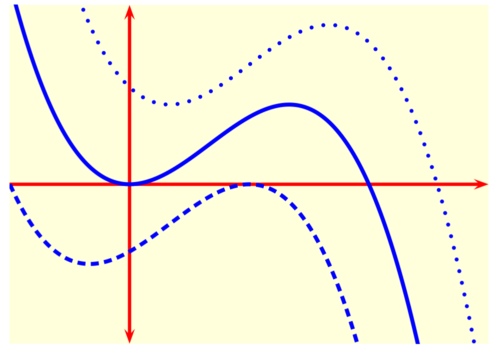
3.



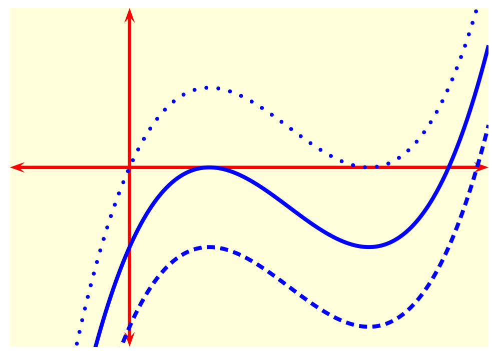
4.



5.



6.



---

013 10.0 points

Find the value of $f(e)$ when

$$f''(x) = \frac{2}{x^2}, \qquad x > 0,$$

and $f(1) = 6$, $f'(2) = 2$.

1. $f(e) = e + 7$

2. $f(e) = 2e + 5$

3. $f(e) = e - 7$

4. $f(e) = 2e - 5$

5. $f(e) = 3e - 1$

6. $f(e) = 3e + 1$

---

014 10.0 points

A particle moves along the x-axis so that its acceleration at time t is

$$a(t) = 11 - 8t$$

in units of feet and seconds. If the velocity of the particle at $t = 0$ is 20 ft/sec, how many seconds will it take for the particle to reach its furthest point to the right?

1. 2 seconds

2. 3 seconds

3. 5 seconds

4. 4 seconds

5. 6 seconds

015 10.0 points

The acceleration of a particle moving along the x-axis at time t is given by $a(t) = 6t - 2$.

If the velocity is 25 when $t = 3$ and the position is 10 when $t = 1$, then find the position $x(t)$.

1. $x(t) = t^3 - t^2 + 9t - 20$

2. $x(t) = t^3 - t^2 + 4t + 6$

3. $x(t) = 9t^2 + 1$

4. $x(t) = 36t^3 - 4t^2 - 77t + 55$

5. $x(t) = 3t^2 - 2t + 4$

016 10.0 points

Rewrite the sum

$$S = 2 + 4 + 6 + \ldots + 22$$

using sigma notation.

1. $S = \sum_{k=1}^{2} 11$

2. $S = \sum_{k=1}^{2} 11k$

3. $S = \sum_{k=1}^{11} 2$

4. $S = \sum_{k=1}^{11} 2k$

5. $S = \sum_{k=1}^{22} k$

6. $S = \sum_{k=1}^{22} 11$

017 10.0 points

Rewrite the sum

$$\left\{5+\left(\frac{1}{9}\right)^2\right\}+\left\{10+\left(\frac{2}{9}\right)^2\right\}+\ldots+\left\{35+\left(\frac{7}{9}\right)^2\right\}$$

using sigma notation.

1. $\sum_{i=1}^{7} \left\{i + \left(\frac{5i}{9}\right)^2\right\}$

2. $\sum_{i=1}^{9} \left\{5i + \left(\frac{i}{9}\right)^2\right\}$

3. $\sum_{i=1}^{7} 5\left\{i + \left(\frac{i}{9}\right)^2\right\}$

4. $\sum_{i=1}^{7} \left\{5i + \left(\frac{i}{9}\right)^2\right\}$

5. $\sum_{i=1}^{9} 5\left\{i + \left(\frac{5i}{9}\right)^2\right\}$

6. $\sum_{i=1}^{9} 5\left\{i + \left(\frac{i}{9}\right)^2\right\}$

018 10.0 points

Rewrite the sum

$$\frac{6}{n}\left(4+\frac{5}{n}\right)^2 + \frac{6}{n}\left(4+\frac{10}{n}\right)^2 + \ldots + \frac{6}{n}\left(4+\frac{5n}{n}\right)^2$$

using sigma notation.

1. $\displaystyle\sum_{i=1}^{n} \frac{5}{n}\left(4+\frac{6i}{n}\right)^2$

2. $\displaystyle\sum_{i=1}^{n} \frac{5}{n}\left(4i+\frac{6i}{n}\right)^2$

3. $\displaystyle\sum_{i=1}^{n} \frac{6}{n}\left(4i+\frac{5i}{n}\right)^2$

4. $\displaystyle\sum_{i=1}^{n} \frac{5i}{n}\left(4+\frac{6i}{n}\right)^2$

5. $\displaystyle\sum_{i=1}^{n} \frac{6i}{n}\left(4+\frac{5i}{n}\right)^2$

6. $\displaystyle\sum_{i=1}^{n} \frac{6}{n}\left(4+\frac{5i}{n}\right)^2$

---

019 10.0 points

Estimate the area, A, under the graph of

$$f(x) = \frac{2}{x}$$

on [1, 5] by dividing [1, 5] into four equal subintervals and using right endpoints.

1. $A \approx \dfrac{5}{2}$

2. $A \approx \dfrac{77}{30}$

3. $A \approx \dfrac{73}{30}$

4. $A \approx \dfrac{38}{15}$

5. $A \approx \dfrac{37}{15}$

---

020 10.0 points

Estimate the area under the graph of

$$f(x) = 19 - x^2$$

on [0, 4] by dividing [0, 4] into four equal subintervals and using right endpoints as sample points.

1. area $\approx$ 49

2. area $\approx$ 47

3. area $\approx$ 50

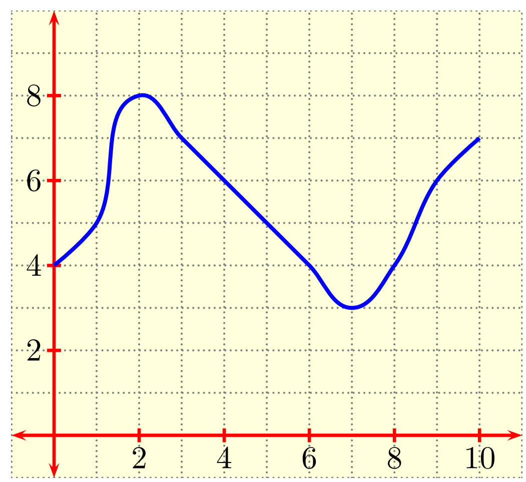
4. area $\approx$ 46

5. area $\approx$ 48

---

021 10.0 points

The graph of a function f on the interval [0, 10] is shown in



Estimate the area under the graph of f by dividing [0, 10] into 10 equal subintervals and using right endpoints as sample points.

1. area $\approx$ 54

2. area $\approx$ 55

3. area $\approx$ 56

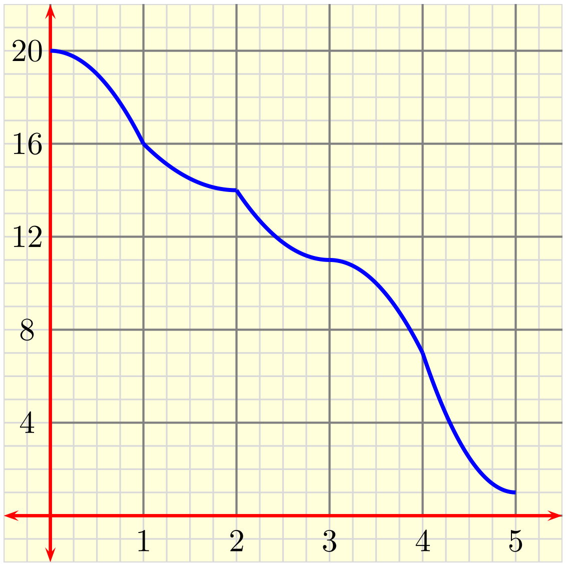
4. area $\approx$ 57

5. area $\approx$ 53

---

022 10.0 points

Cyclist Joe brakes as he approaches a stop sign. His velocity graph over a 5 second period (in units of feet/sec) is shown in



Compute best possible upper and lower estimates for the distance he travels over this period by dividing [0, 5] into 5 equal subintervals and using endpoint sample points.

1. 47 ft $<$ distance $<$ 66 ft

2. 45 ft $<$ distance $<$ 66 ft

3. 49 ft $<$ distance $<$ 66 ft

4. 45 ft $<$ distance $<$ 68 ft

5. 47 ft $<$ distance $<$ 64 ft

6. 49 ft $<$ distance $<$ 64 ft

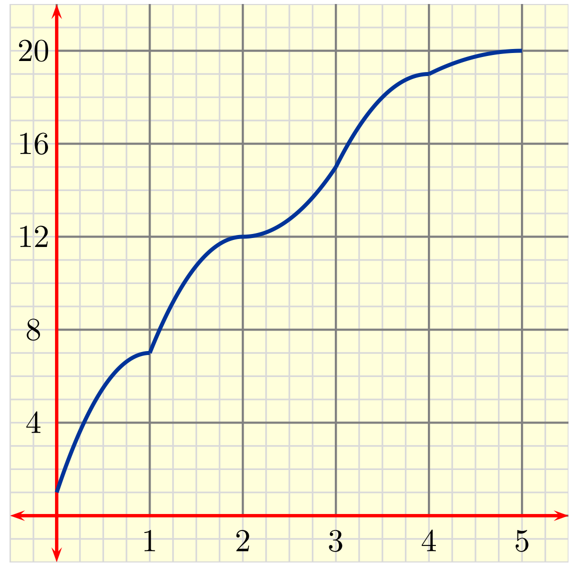
7. 45 ft $<$ distance $<$ 64 ft

8. 47 ft $<$ distance $<$ 68 ft

9. 49 ft $<$ distance $<$ 68 ft

023 10.0 points

Cyclist Joe accelerates as he rides away from a stop sign. His velocity graph over a 5 second period (in units of feet/sec) is shown in



Compute the best possible **upper** estimate for the distance he travels over this period when dividing [0, 5] into 5 equal subintervals and using endpoint sample points.

Hint: *you will have to decide which endpoints to use.*

1. distance $<$ 77 ft

2. distance $<$ 73 ft

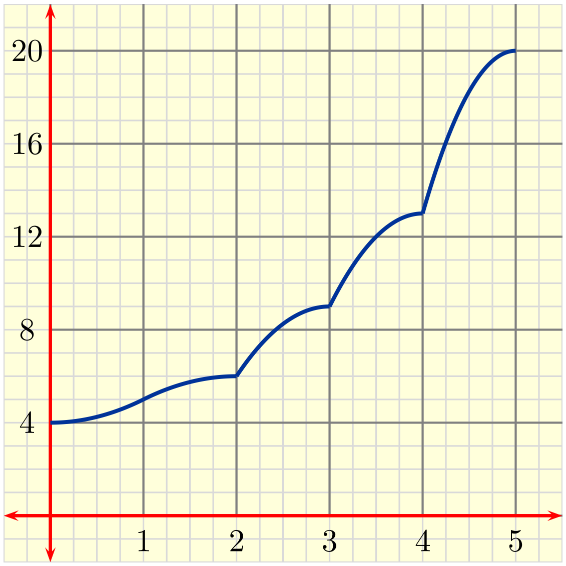
3. distance $<$ 71 ft

4. distance $<$ 75 ft

5. distance $<$ 69 ft

024 10.0 points

Cyclist Joe accelerates as he rides away from a stop sign. His velocity graph over a 5 second period (in units of feet/sec) is shown in



Compute best possible lower estimate for the distance he travels over this period when dividing [0, 5] into 5 equal subintervals and using endpoint sample points.

1. 41 ft $<$ distance

2. 45 ft $<$ distance

3. 43 ft $<$ distance

4. 39 ft $<$ distance

5. 37 ft $<$ distance

025 10.0 points

Use properties of integrals to determine the value of

$$I = \int_0^5 f(x)\,dx$$

when

$$\int_0^7 f(x)\,dx = 9, \quad \int_5^7 f(x)\,dx = 8.$$

1. $I = 1$

2. $I = 5$

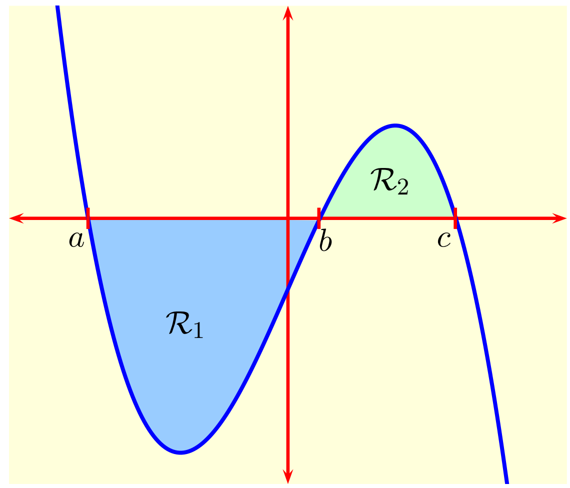
3. $I = 4$

4. $I = 2$

5. $I = 3$

026 10.0 points

When f has graph



express the sum

$$I = \int_a^c 5f(x)\,dx - \int_b^c 2f(x)\,dx$$

in terms of the areas

$$A_1 = \text{area}(\mathcal{R}_1), \qquad A_2 = \text{area}(\mathcal{R}_2)$$

of the respective lighter shaded regions $\mathcal{R}_1$ and $\mathcal{R}_2$.

1. $I = -7A_1 + 5A_2$

2. $I = 3A_2 - 5A_1$

3. $I = -3A_1 + 5A_2$

4. $I = 3A_1 - 5A_2$

5. $I = 5A_1 - 3A_2$

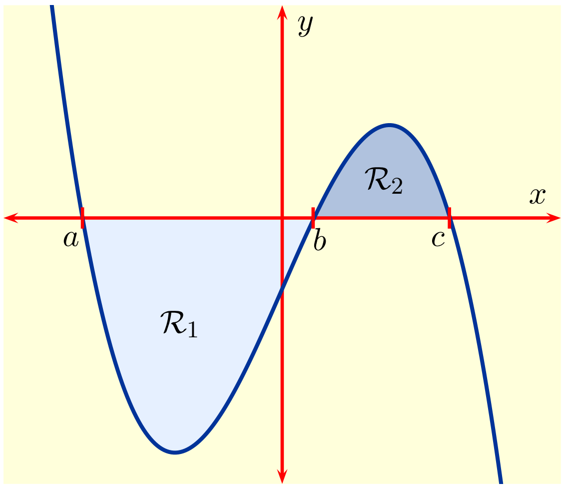
6. $I = 5A_1 - 7A_2$

7. $I = 7A_2 - 5A_1$

8. $I = 7A_1 - 5A_2$

027 10.0 points

When f has graph



express the sum

$$I = \int_a^c \Big\{2f(x) - 3|f(x)|\Big\}\,dx$$

in terms of the areas

$$A_1 = \text{area}(\mathcal{R}_1)\,, \quad A_2 = \text{area}(\mathcal{R}_2)$$

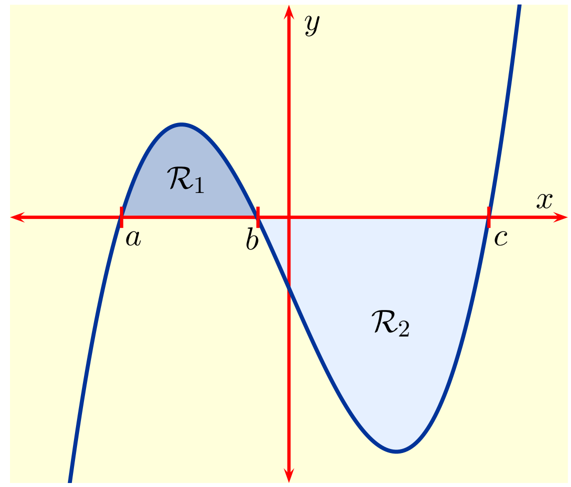
of the respective lighter shaded regions $\mathcal{R}_1$ and $\mathcal{R}_2$.

1. $I = -5A_1 + A_2$
2. $I = -5A_2$
3. $I = -5A_1 - A_2$
4. $I = 5A_1 + A_2$
5. $I = -A_1$
6. $I = 5A_1 - A_2$

---

028 10.0 points

When f has graph



express the value of

$$I = \int_a^c \Big\{2f(x) + |f(x)|\Big\}\,dx$$

in terms of the areas

$$A_1 = \text{area}(\mathcal{R}_1)\,, \quad A_2 = \text{area}(\mathcal{R}_2)$$

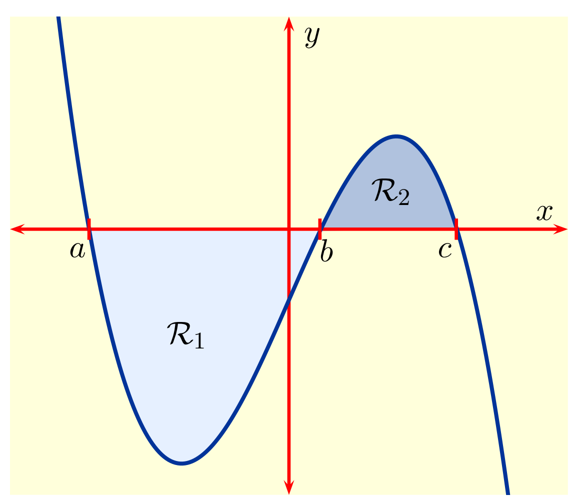
of the respective shaded regions $\mathcal{R}_1$ and $\mathcal{R}_2$.

1. $I = 3A_1 - A_2$
2. $I = 3A_1$
3. $I = -A_2$
4. $I = -3A_1 - A_2$
5. $I = -3A_1 + A_2$
6. $I = 3A_1 + A_2$

---

029 10.0 points

When f has graph



express the sum

$$I = \int_a^c \Big\{ f(x) + 3|f(x)| \Big\} \, dx$$

in terms of the areas

$$A_1 = \text{area}(\mathcal{R}_1)\,, \quad A_2 = \text{area}(\mathcal{R}_2)$$

of the respective lighter shaded regions $\mathcal{R}_1$ and $\mathcal{R}_2$.

1. $I = -2A_1 + 4A_2$

2. $I = 4A_1$

3. $I = 2A_1 + 4A_2$

4. $I = 2A_2$

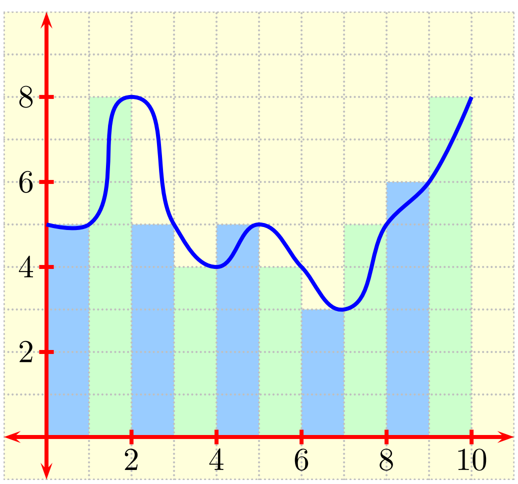
5. $I = 2A_1 - 4A_2$

6. $I = -2A_1 - 4A_2$

---

030 10.0 points

The graph of a function f is shown in



Compute the Riemann sum

$$\sum_{i=1}^{10} f(x_i^*) \, \Delta x$$

when $[0, 10]$ is subdivided into ten equal subintervals $[x_{i-1}, x_i]$ and

$$x_1^* = x_1, \;\; x_2^* = x_2, \;\; \ldots, \;\; x_{10}^* = x_{10}\,.$$

1. Riemann sum $= 51$

2. Riemann sum $= 53$

3. Riemann sum $= 50$

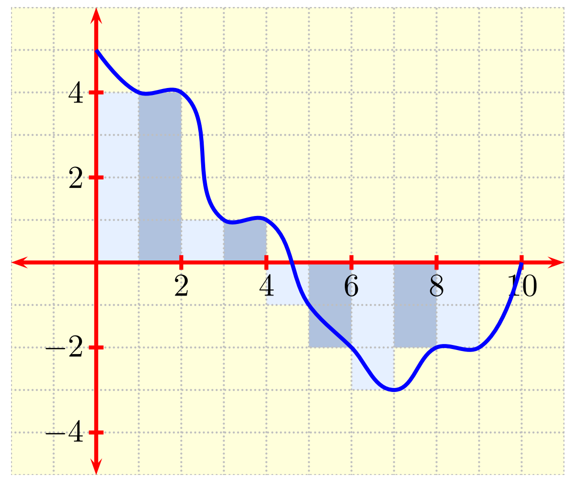
4. Riemann sum $= 52$

5. Riemann sum $= 49$

---

031 10.0 points

When



is the graph of a function f, use rectangles to estimate the definite integral

$$I = \int_0^{10} |f(x)| \, dx$$

by subdividing $[0, 10]$ into 10 equal subintervals and taking right endpoints of these subintervals.

1. $I \approx 19$

2. $I \approx 23$

3. $I \approx 21$

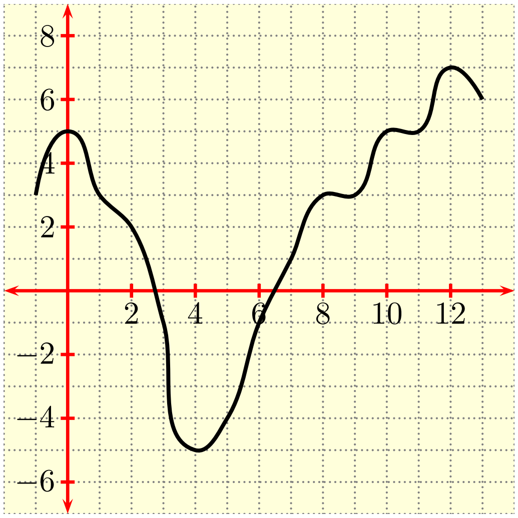
4. $I \approx 20$

5. $I \approx 22$

---

032 10.0 points

Below is the graph of a function f.



Estimate the integral

$$I = \int_0^{12} f(x)\,dx$$

with six equal subintervals using right end-points.

1. $I \approx 20$

2. $I \approx 22$

3. $I \approx 26$

4. $I \approx 18$

5. $I \approx 24$