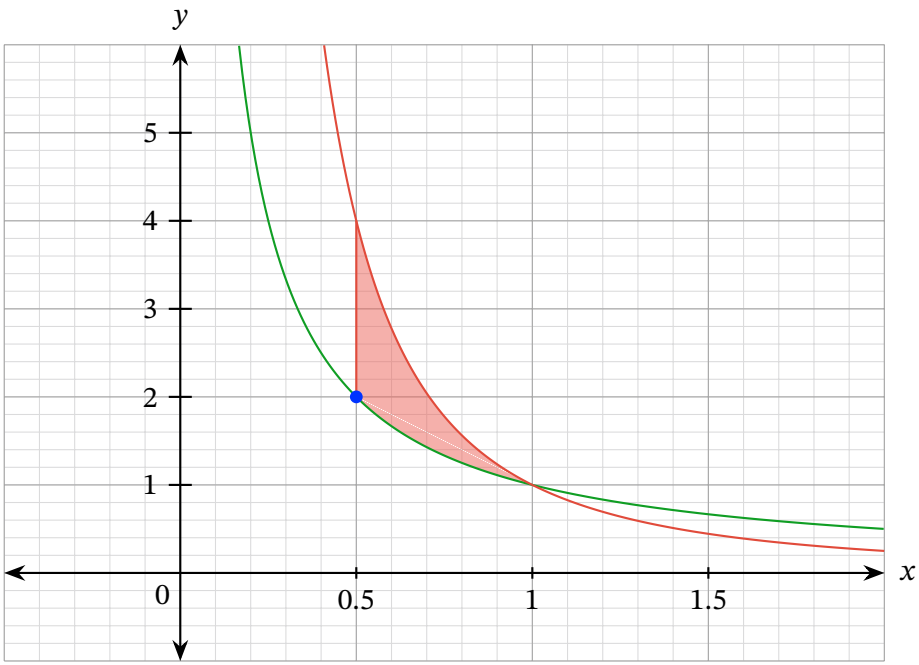
Worksheet: Area between Curves

Q1: The curves shown are $y = \frac{1}{x}$ and $y = \frac{1}{x^2}$. What is the area of the shaded region? Give an exact answer.



A 0.3068528194

B -0.3068528194

C 0.6931471806

D $1 - \ln(2)$

E $1 + \ln(2)$

Q2: Find the area of the region bounded by $y = x^3$ and $y = x$.

A $\frac{3}{2}$

B $\frac{1}{2}$

C $\frac{1}{6}$

D $\frac{5}{6}$

E $\frac{4}{3}$

Q3: Find the area of the region bounded by the curves $y = 3x^2 - 5x$ and $y = -5x^2$.

A $\frac{125}{384}$

B $\frac{625}{384}$

C $\frac{25}{48}$

D $\frac{1{,}375}{24}$

E $\frac{25}{192}$

Q4: Find the area of the region bounded by the curves $y = \frac{\ln x}{x}$ and $y = \frac{(\ln x)^2}{x}$.

A 5

B $\frac{5}{6}$

C $\frac{3}{2}$

D $\frac{1}{6}$

E $\frac{1}{3}$

Q5: Determine, to the nearest thousandth, the area of the plane region bounded by the curve $y = \sqrt{2x - 2}$ and the lines $x = 2$, $x = 3$, and $y = 0$.

A 7.757

B 3.879

C 1.724

D 5.172

Q6: The plan view of a single corridor floor is bounded by lines $x = 0$, $y = 0$ and the curve $y = \frac{5x^2}{3} - 15$, all measured in meters. What is the cost of covering 6 such corridors with granite at the price of 200 pounds per square meters?

A 36,000 pounds

B 72,000 pounds

C 1,200 pounds

D 6,000 pounds

Q7: Determine the area of the plane region bounded by the curve $y = -x^2 + 20$, the x-axis, and the two lines $x = -3$ and $x = 2$.

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A $\frac{265}{3}$ square units

B $\frac{21}{2}$ square units

C 65 square units

D $\frac{41}{3}$ square units

Q8: Find the area of the region bounded by $y = \sqrt{x-5}$ and $x - 3y = 3$.

A $\frac{1}{3}$

B $15\frac{1}{6}$

C $9\frac{1}{6}$

D $\frac{1}{6}$

E $5\frac{5}{6}$

Q9: Find the area of the region bounded by $x = y^4$, $y = -\sqrt{-2x+1}$, and $y = 0$.

A $\frac{1}{16} + \frac{5\sqrt{2}}{24}$

B $-\frac{1}{16} + \frac{5\sqrt{2}}{24}$

C $\frac{\sqrt{2}}{8}$

D $\frac{11\sqrt{2}}{60}$

E $\frac{\sqrt{2}}{3}$

Q10: Find the area of the region bounded by $x = y$ and $2x + y^2 = 3$.

A $\frac{64}{3}$

B $\frac{29}{6}$

C $\frac{16}{3}$

D 8

E $\frac{28}{3}$

Q11: Find the area of the region bounded by $x = -5y^2 + 1$ and $x = 2y^2 - 5$.

A $\frac{8\sqrt{42}}{7}$

B $10\sqrt{3}$

C $\frac{59\sqrt{42}}{54}$

D $\frac{12\sqrt{42}}{7}$

E $\frac{80\sqrt{42}}{49}$

Q12: Find the area of the region bounded by $y = \cos x$ and $y = -3\cos x + 2$, where $0 \leq x \leq \pi$.

A $-\frac{2\pi}{3} + 4$

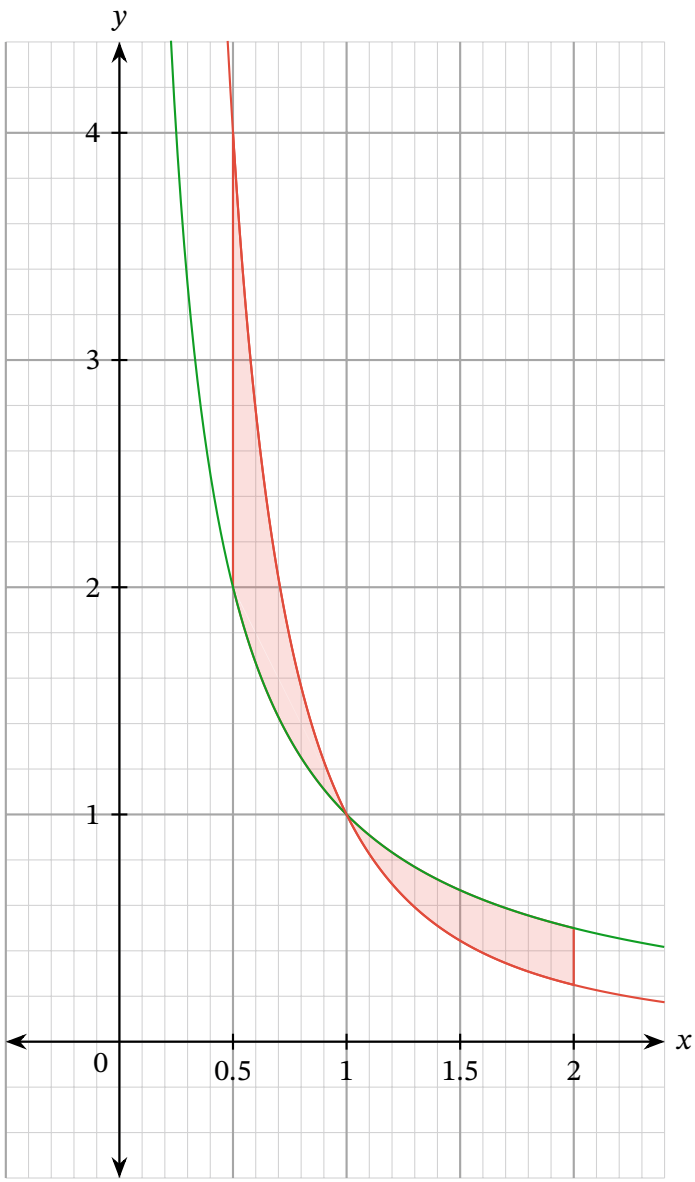
B $-3 + \sqrt{3} + \frac{2\pi}{3}$

C $-1 + \frac{2\pi}{3} + 3\sqrt{3}$

D $4 + \frac{4\pi}{3}$

E $\frac{2\pi}{3} + 4\sqrt{3}$

Q13: The curves shown are $y = \frac{1}{x}$ and $y = \frac{1}{x^2}$. What is the area of the shaded region? Give an exact answer.



A $\frac{3}{2} + \ln 4$

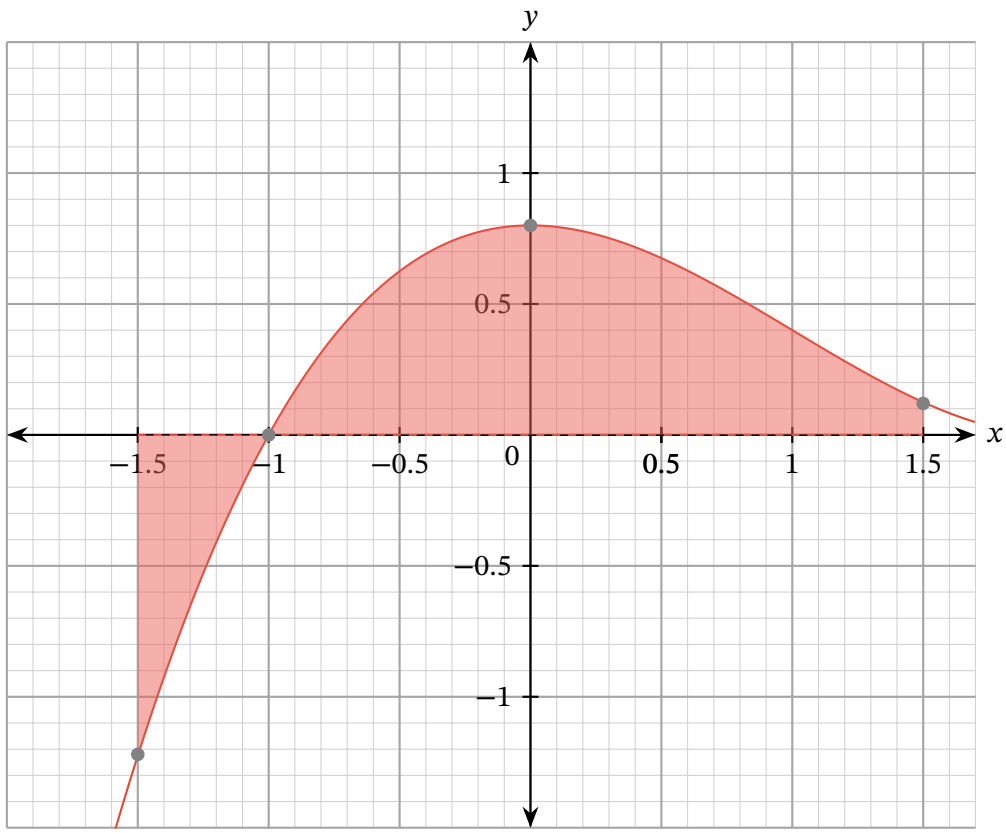
B $\ln 4 + 2$

C $\ln 4 - \frac{1}{2}$

D $\frac{1}{2}$

E $\frac{3}{2} - \ln 4$

Q14: The curve in the figure is $y = \frac{1}{5}\left(x^3 - 3x^2 + 4\right)$.



What is the area of the shaded region? Give your answer exactly as a fraction.

A $\frac{21}{20}$

B $\frac{553}{320}$

C $\frac{21}{4}$

D $\frac{257}{160}$

E $\frac{257}{32}$

Q15: Find the area of the region bounded by $y = 3\cos x - 4$ and $y = -5\cos x$, where $0 \leq x \leq 2\pi$.

A $-2\sqrt{3} + \frac{16\pi}{3}$

B $3\sqrt{3} + \frac{16\pi}{3}$

C $2\sqrt{3} + \frac{16\pi}{3}$

D $\frac{16\pi}{3}$

E $8\sqrt{3} + \frac{16\pi}{3}$

Q16: Determine, to the nearest thousandth, the area of the region bounded by the graph of the function $f: f(x) = (x-8)(x-3)(x-2)$, where $f(x) \geq 0$, and the lines $x = 9$ and $y = 0$.

A 19.833 area units

B 39.666 area units

C 378.000 area units

D 53.083 area units

Q17: Find the area of the region enclosed by the curves $y = x$, $y = \sin x$, $x = \frac{\pi}{2}$, and $x = \pi$.

A $-1 + \frac{3\pi^2}{8}$

B $1 + \frac{3\pi^2}{8}$

C $-1 + \frac{3\pi^2}{4}$

D $1 + \frac{3\pi^2}{4}$

E $-1 + \frac{\pi^2}{2}$

Q18: Find the area of the region enclosed by the curves $y = 16\cos x$ and $y = 2\sec^2 x$ for x between $-\frac{\pi}{3}$ and $\frac{\pi}{3}$.

A $12\sqrt{3}$

B $4\sqrt{3}$

C $\sqrt{3}$

D $2\sqrt{3}$

E $\frac{52\sqrt{3}}{3}$

Q19: Consider the region in the first quadrant enclosed by the curves $y = \frac{4}{x}$, $y = x$, and $y = \frac{x}{4}$. Find the area of this region.

A $\frac{3}{2} + 4\ln 2$

B $4\ln 8$

C $1 + 4\ln 2$

D $4\ln 2$

E $4\ln 2 + \frac{7}{2}$

Q20: Find the area of the region bounded by the curves $y = \frac{x}{x^2+1}$ and $y = \frac{x^2}{x^3+1}$.

A $\frac{5}{6}\ln 2$

B $2\ln 2$

C $\frac{2}{3}\ln 2$

D $\frac{1}{6}\ln 2$

E $\frac{1}{2}\ln 2$

Q21: Find the area of the region enclosed by the curves $y = e^{2x}$ and $y = 2x^2 - 5$ and the lines $x = -3$ and $x = 1$.

A $\frac{e^2}{2} - 12 - \frac{1}{2e^6}$

B $\frac{e^2}{2} - \frac{8}{3} - \frac{1}{2e^6}$

C $e^2 - 12 - \frac{1}{e^6}$

D $\frac{e^2}{2} + \frac{4}{3} - \frac{1}{2e^6}$

E $e^2 + \frac{4}{3} - \frac{1}{e^6}$

Q22: Find the area of the region bounded above by $y = 2x$ and below by $y = 2x^2 - 5x$.

A $57\frac{1}{6}$

B $44\frac{11}{12}$

C $14\frac{7}{24}$

D $71\frac{11}{24}$

E $114\frac{1}{3}$

Q23: Find the area of the region enclosed by the curves $y = 5x$ and $y = (2x - 5)^2$.

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A $\frac{125}{3}$

B $\frac{1,125}{32}$

C $\frac{625}{8}$

D $\frac{625}{6}$

E $\frac{125}{6}$

Q24: Find the area of the region bounded above by $y = \frac{1}{x}$, bounded below by $y = \frac{1}{2x^2}$, and bounded on the side by $x = 1$.

A $\ln 2 + 6$

B $\frac{1}{4} + \ln 2$

C $\ln 2 + 2$

D $-\ln 2 + 1$

E $-\frac{1}{2} + \ln 2$

Q25: Find the area of the region bounded by $y = 2 - |x|$ and $y = x^4$.

A $1\frac{2}{5}$

B $2\frac{4}{5}$

C $1\frac{3}{10}$

D $3\frac{3}{5}$

E $2\frac{3}{5}$