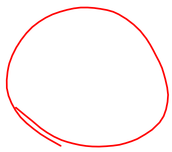
Cauchy-Schwarz.

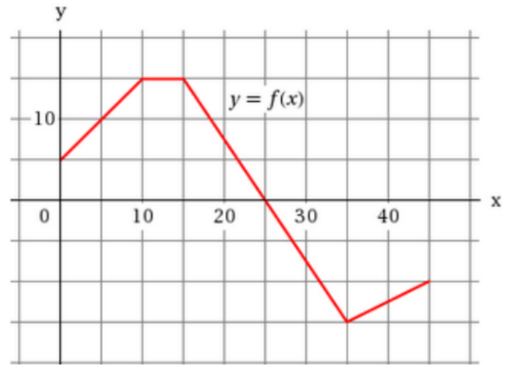
$$3\cdot 2 + 4\cdot 5 \leq \sqrt{3^2+4^2}\sqrt{2^2+5^2}$$

$$\sum fg \leq \sqrt{\sum f^2}\sqrt{\sum g^2}$$

$$\int fg \leq \sqrt{\int f^2}\sqrt{\int g^2}$$



The graph of f is shown. Evaluate each integral by interpreting it in terms of areas.



(a) $\int_0^{10} f(x)\,dx$

(b) $\int_0^{25} f(x)\,dx$

(c) $\int_{25}^{35} f(x)\,dx$

(d) $\int_0^{45} f(x)\,dx$

$$\int_0^{45} f(x)dx = \int_0^{10} f(x)\,dx + \int_{10}^{15} f(x)dx + \int_{15}^{25} f(x)dx + \int_{25}^{35} f(x)dx + \int_{35}^{45} f(x)\,dx$$

1 + 2 + 3 + 4 + 5

① $b_1 = 5,\ b_2 = 15,\ h = 10$

Trapezoid Area =

$\frac{1}{2}(b_1+b_2)h = \frac{1}{2}(5+15)10$

$= \frac{1}{2}(20)(10) = \boxed{100 = A_1}$

② Rect. $15\cdot 5 = \boxed{75 = A_2}$

③ $A_3 = \frac{1}{2}bh = 10\cdot 15 = \boxed{150 = A_3}$

④ $10(-15) = \boxed{-150 = A_4}$

⑤ $\frac{1}{2}(-15-10)(10) = -\frac{1}{2}(25)(10) = -5\cdot 25 = -125$

$\int_0^{45} f(x)\,dx = \sum_{k=1}^{5} A_k = 100 + 75 + 150 - 150 - 125$

$= 175 - 125 = \boxed{50 = \text{Area}}$

is net area.

What about $\int_0^{45} |f(x)|\,dx = \sum |A_k|$

$= 100 + 75 + 150 + 150 + 125$

$= 175 + 300 + 125 = 475 + 125 = \boxed{600 = \int |f|}$

$$\int_0^1 (5-3x^2)\,dx \quad , \text{given} \quad \int_0^1 x^2 dx = \frac{1}{3}$$

$$\int_0^1 (5-3x^2)\,dx = \int_0^1 5\,dx + \int_0^1 (-3x^2\,dx)$$

$$= 5\int_0^1 1\,dx - 3\int_0^1 x^2 dx$$

$$= 5[1-0] - 3\left[\frac{1}{3}\right] = 5 - 1 = 4 = \int_0^1 (5-3x^2)\,dx$$

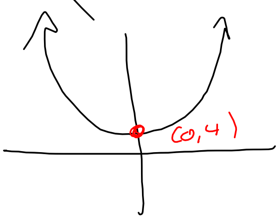
$$\sum_{k=1}^{n} \left(\frac{k^2}{n^2} + \frac{5k}{n} - 4\right)$$

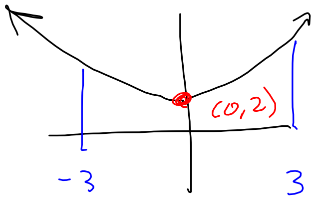
$$= \frac{1}{n^2}\sum k^2 + \frac{5}{n}\sum k - 4\sum 1$$

16. Question Details SCalc8 4.2.057. [3353944

Use the properties of integrals to choose the inequality that would make the statement true without evaluating th integrals.

$$12 \le \int_{-3}^{3} \sqrt{4 + x^2}\, dx \le 6\sqrt{13}$$





x^2+4

$m = 2$

$M = \sqrt{4+3^2} = \sqrt{13}$

$b-a = 3-(-3) = 6$

$2 \cdot 6 \le \int \le 6\sqrt{13}$

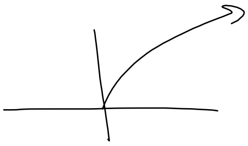
$1 \le \sqrt{1+x^3} \le 1+x^3$

$\sqrt{x}$ is increasing function of x

$x \ge 0$, then

$x^3 \ge 0$

$1 = \sqrt{1} \le \sqrt{1+x^3}$



$\forall\ x \ge 1,\ \sqrt{x} \ge \sqrt{1}$

$1+x^3$

$\sqrt{☺} \le ☺$ if

☺ ≥ 1 & this is the case,

since $1+x^3 \ge 1$

If $f \ge g$ on $[a,b]$

Then $\int_a^b f\,dx \ge \int_a^b g\,dx$

So

$1 \le \sqrt{1+x^3} \le 1+x^3 \Longrightarrow$

$$\int_0^1 1\,dx = \int_0^1 x^0\,dx \le \int_0^1 \sqrt{1+x^3}\,dx \le \int_0^1 (1+x^3)\,dx$$

$$= \left[\frac{x^1}{1}\right]_0^1 \le \int_0^1 \sqrt{1+x^3}\,dx \le \left[x + \frac{x^4}{4}\right]_0^1$$

$$1-0 \le \int_0^1 \sqrt{1+x^3}\,dx \le 1+\frac{1^4}{4} - \left(0+\frac{0^4}{4}\right)$$

$$1 \le \int_0^1 \sqrt{x^3+1}\,dx \le \frac{5}{4} = 1.25 < 1.41$$

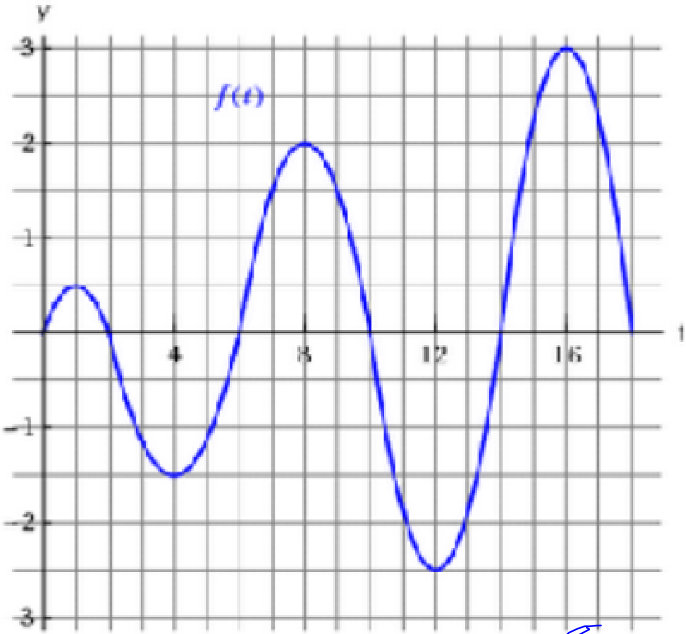
Note This estimate's better than

$(\min)(b-a) \le \int_a^b f \le (\max)(b-a) =$

$\sqrt{1+1^3} = \sqrt{2} \approx 1.41 > 1.25$

$\int e^{-x^2}dx$ has no closed-form antiderivative

Note 4 future.



local max of $\int_0^x f(t)\,dt$

$x = 2, 10, 18$

mins @ $x = 6, 14$