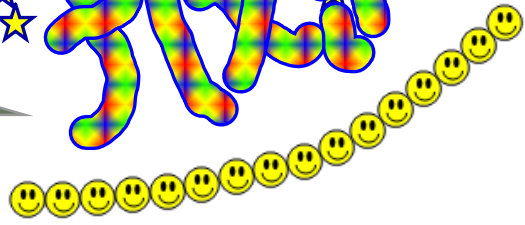
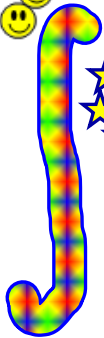


Calculus Game
Review

Δx



1) WHAT IS THE AVERAGE RATE OF CHANGE OF THE FUNCTION f GIVEN BY

$$f(x) = x^4 - 5x$$

ON THE CLOSED INTERVAL $[0,3]$

A) 8.5

$$\frac{f(3) - f(0)}{3 - 0}$$

B) 8.7

$$\int_0^3 f'(x) dx$$

C) 22

$$\frac{0}{3 - 0}$$

D) 33

E) 66



2) WHAT IS THE AREA BOUNDED BY THE GRAPHS OF $y=5x-x^2$ AND $y=2x$?

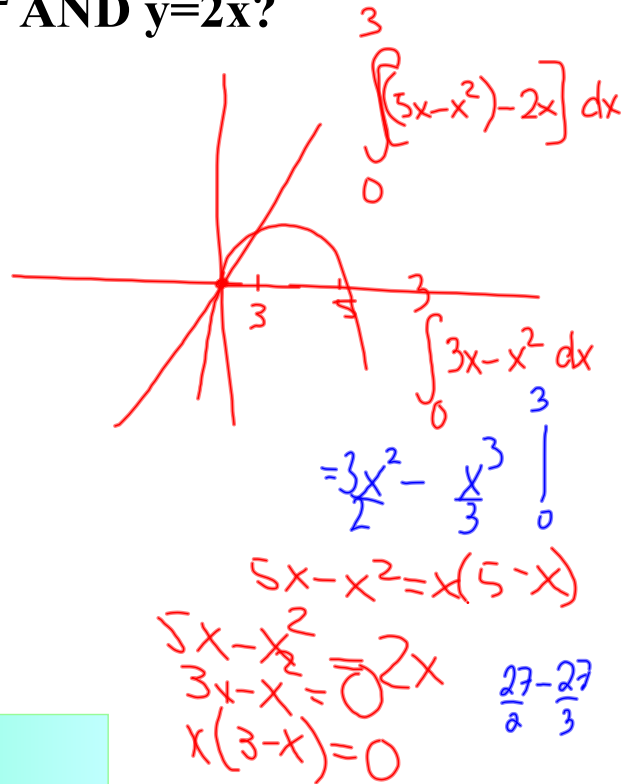
A) $25/6$

B) $9/2$

C) 9

D) $27/2$

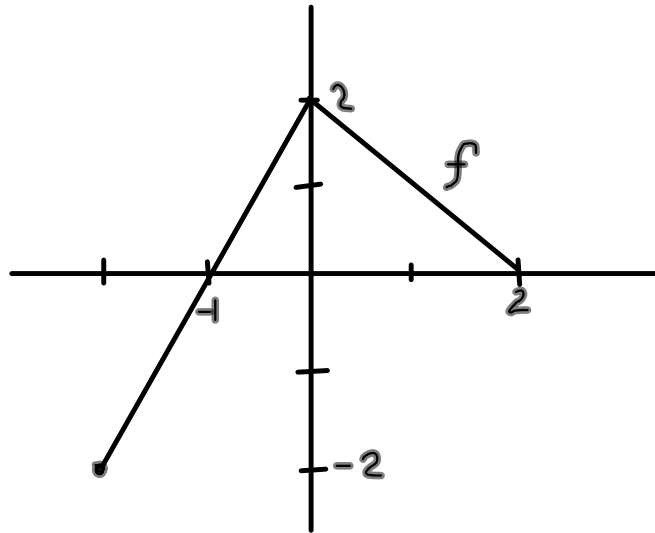
E) $45/2$



4) THE GRAPH OF THE THE FUNCTION f SHOWN ABOVE CONSISTS OF TWO LINE SEGMENTS. IF g IS THE FUNCTION DEFINED BY $g(x) = \int_0^x f(t) dt$

THEN $g(-1) =$

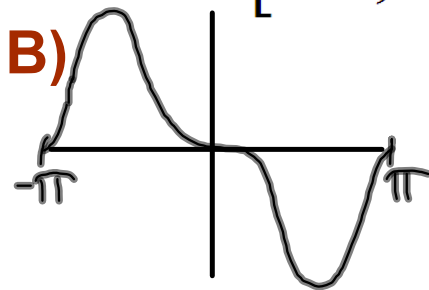
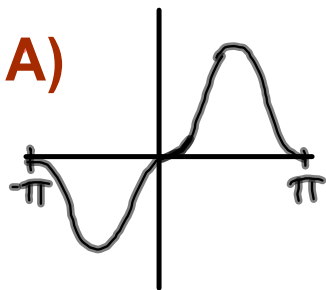
- A) -2
- B) -1
- C) 0
- D) 1
- E) 2



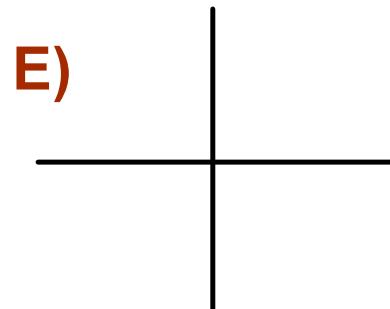
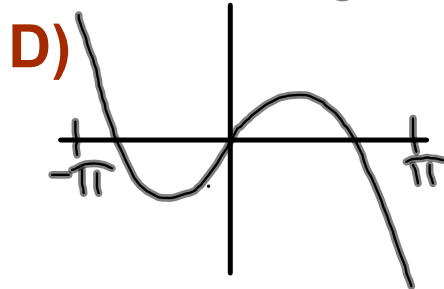
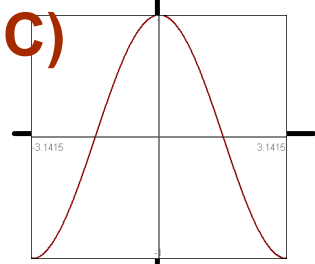
$$g(-1) = \int_0^{-1} f(t) dt = -1$$

(B)

5) THE GRAPHS OF FIVE FUNCTIONS ARE SHOWN BELOW. WHICH FUNCTION HAS A NONZERO AVERAGE OVER THE CLOSED INTERVAL $[-\pi, \pi]$?



Assume symmetries in hand drawn graphs here.



6) Oil is leaking out of a tanker at the rate of

$$R(t) = 2000e^{-0.2t}$$

gallons per hour where t is measured in hours.

How much oil leaks out of the tanker from time $t=0$ to $t=10$?

- A) 54 gallons
- B) 271 gallons
- C) 865 gallons
- D) 8647 gallons
- E) 14.778 gallons

9) If $\int_0^3 (x^2 - 4x + 4) dx$ is approximated by 3 inscribed rectangles of equal width on the x-axis, then the approximation is

A) 6

D) 2

B) 5

E) 1

C) 3



10) The average value of $f(x) = \sqrt{x}$ on the interval $0 \leq x \leq 9$ is

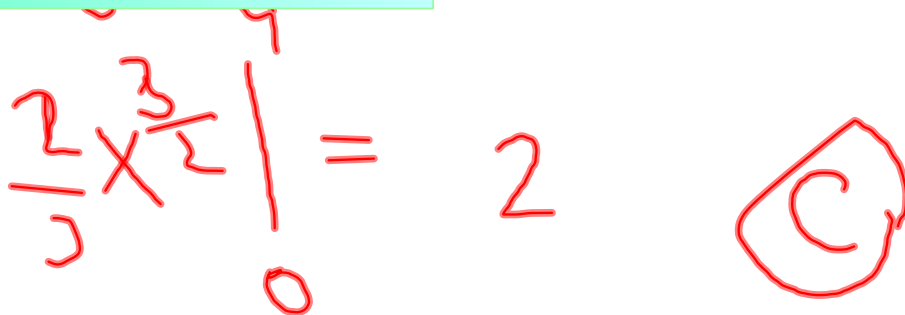
A) $1/3$

E) 18

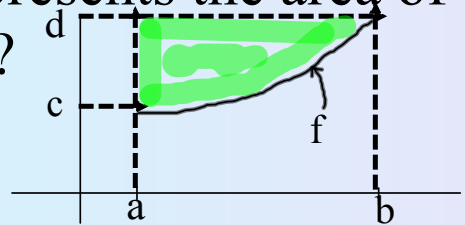
B) $3/2$

C) 2

D) $9/2$


$$\frac{2}{5} \times \frac{3}{2} \times \frac{1}{1} = 2 \quad \text{C}$$

11) Which of the following represents the area of the shaded region in the figure?



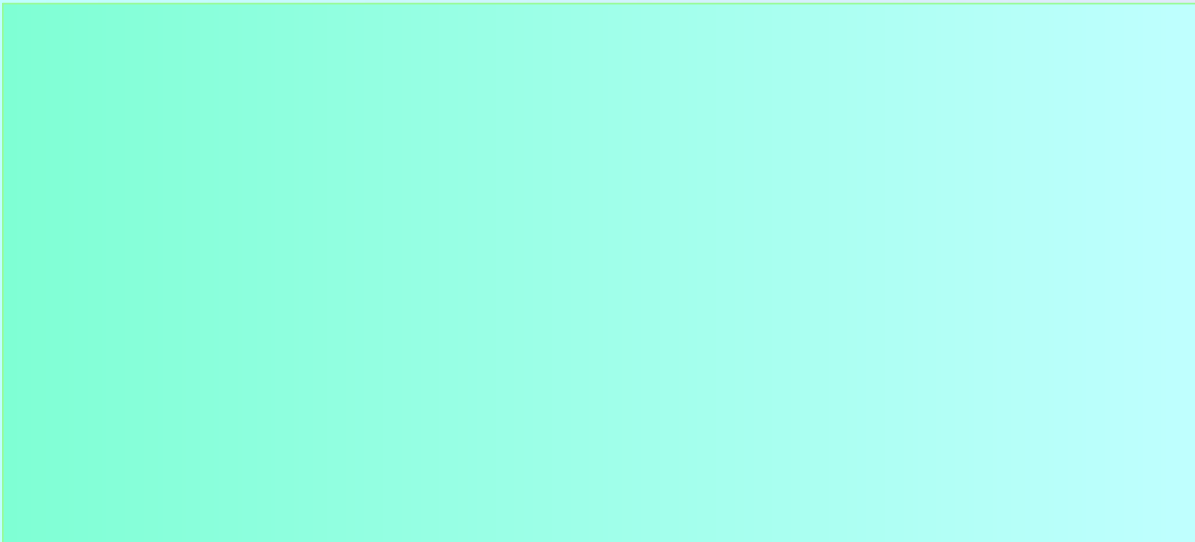
A) $\int_c^d f(y)dy$

B) $\int_a^b (d - f(x))dx$

C) $f'(b) - f'(a)$

D) $(b - a)(f(b) - f(a))$

E) $(d - c)(f(b) - f(a))$



12) The graph of a twice differentiable function f is shown in the figure. Which of the following is true?

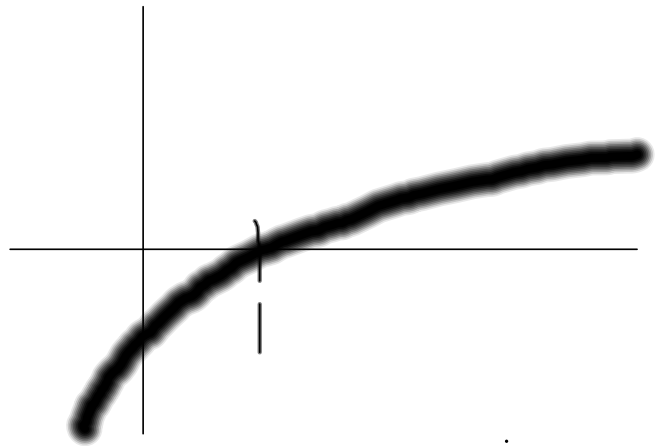
A) $f(1) < f'(1) < f''(1)$

B) $f(1) < f''(1) < f'(1)$

C) $f'(1) < f(1) < f''(1)$

D) $f''(1) < f(1) < f'(1)$

E) $f''(1) < f'(1) < f(1)$



13) What are all values of k for which

$$\int_{-3}^k x^2 dx = 0$$

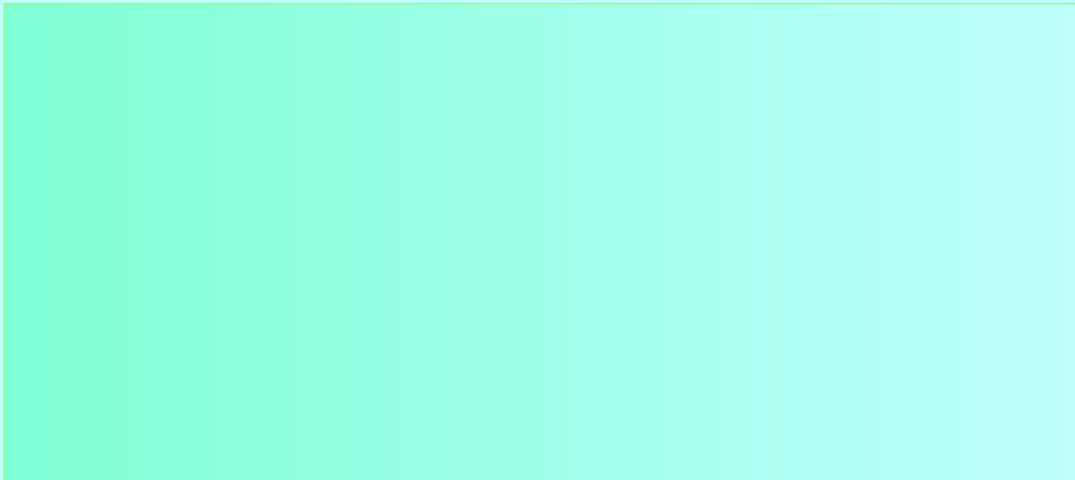
A) 3

D) -3 and 3

B) 0

E) -3, 0 and 3

C) -3



14) The function h is continuous for all real numbers. The average of $h(x)$ on the closed interval $[2,5]$ is 9. What is

$$\int_2^5 (3h(x) + 7) dx?$$

A) 34

D) 88

B) 81

E) 102

C) 82

F) None of these.

15) If m is an ***odd*** function and $\int_3^4 m(p) dp = 6$ and

$$\int_3^8 m(p) dp = 11 \quad \text{then} \quad \int_{-4}^{-8} m(p) dp = ?$$

A) -17

D) 6

B) -5

E) 17

C) 5

F) None of these

a toughy

19) Write the integral that the following RH sum approximates.

$$\left(\frac{3}{4} \cdot 1 + 4\right)^3 \cdot \frac{3}{4} + \left(\frac{3}{4} \cdot 2 + 4\right)^3 \cdot \frac{3}{4} + \left(\frac{3}{4} \cdot 3 + 4\right)^3 \cdot \frac{3}{4} + \left(\frac{3}{4} \cdot 4 + 4\right)^3 \cdot \frac{3}{4}$$