SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Express the limit as a definite integral.

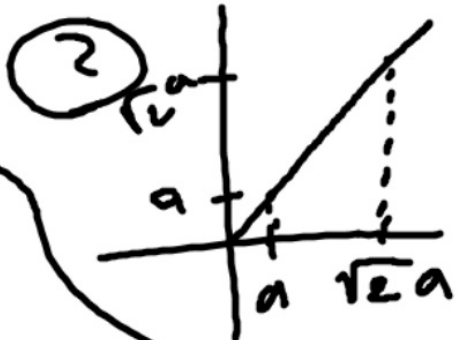
1) $\lim_{n\to\infty} \sum_{k=1}^{n} (3c_k^2 - 6c_k + 16)\Delta x_k$, [−9, 2]

$$\int_{-9}^{2} 3x^2 - 6x + 16\,dx$$

1) ____________

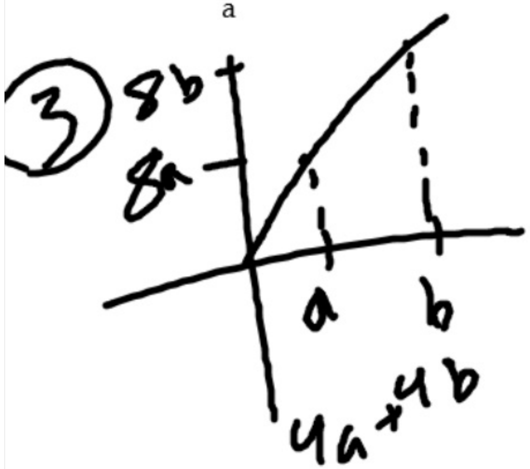
Use areas to evaluate the integral.

2) $\int_a^{\sqrt{2}a} x\,dx$, $a > 0$



$$\frac{(\sqrt{2}a + a)(\sqrt{2}a - a)}{2} = \frac{2a^2 - a^2}{2} = \frac{a^2}{2}$$

3) $\int_a^b 8x\,dx$, $0 < a < b$



$$\frac{(8a+8b)(b-a)}{2}$$

$$4(b+a)(b-a) = 4(b^2-a^2)$$

3) $\int_a 8x\,dx, \quad 0 < a < b$

$\frac{d}{dx}\cot x = -\csc^2 x$

3) ______

Express the desired quantity as a definite integral and evaluate the integral.

4) Find the distance of a train moving at 50 mph from 6:00 A.M. to 9:30 A.M.

4) $\int_0^{3.5} 50\,dt$

Find dy/dx.

$u = \cot x$ $\quad \frac{dy}{du} \cdot \frac{du}{dx}$ $\quad$ 5 $\quad y = \int_{\pi/4}^{u} \csc^2 t\,dt$

5) $\int_{\pi/4}^{\cot x} \csc^2 t\,dt$

5) ______

$u = \cot x$ $\quad \frac{dy}{du} = \csc^2 u$

$\frac{du}{dx} = -\csc^2 x$

$\csc^2(\cot x) \cdot (-\csc^2 x)$

6) $\int_0^x \sqrt{4t+7}\,dt$

6) $\sqrt{4x+7}$

7) $\int_0^{9 \ln x} e^t\,dt$

7) ______

3) $\int_a 8x\,dx, \quad 0 < a < b$ 3) ____________

$\frac{d}{dx} \ln x = \frac{1}{x}$

Express the desired quantity as a definite integral and evaluate the integral.

4) Find the distance of a train moving at 50 mph from 6:00 A.M. to 9:30 A.M. 4) ____________

Find dy/dx.

5) $\int_{\pi/4}^{\cot x} \csc^2 t\,dt$ 5) ____________

6) $\int_0^{x} \sqrt{4t + 7}\,dt$ 6) ____________

7) $\int_0^{9 \ln x} e^t\,dt$ 7) $9x^8$

7

$u = 9 \ln x$

$\frac{du}{dx} = \frac{9}{x}$

$y = \int_0^u e^t\,dt$

$\frac{dy}{du} = e^u$

$= \frac{9}{x} e^{9 \ln x} = \frac{9}{x} e^{\ln x^9} = \frac{9x^9}{x} =$

Construct a function of the form $y = \int_a^x f(t)\,dt + C$ that satisfies the given conditions.

8) $\frac{dy}{dx} = \csc x$, and $y = -8$ when $x = 4$ 8) $y = \int_4^x \csc t\,dt - 8$

Construct a function of the form $y = \int_a^x f(t)\,dt + C$ that satisfies the given conditions.

8) $\dfrac{dy}{dx} = \csc x$, and $y = -8$ when $x = 4$ 8) ______________

Evaluate the integral.

9) $\displaystyle\int_2^{-1} 3^x\,dx$ 9) $\dfrac{26}{3\ln 3}$

$$\int_2^{-1} \frac{1}{\ln 3} 3^x$$

$$\frac{1}{\ln 3}3^2 - \frac{1}{\ln 3}3^{-1}$$

$$\frac{3 \cdot 9}{3 \cdot \ln 3} - \frac{1}{3\ln 3} = \frac{27}{3\ln 3} - \frac{1}{3\ln 3}$$

10) $\int_{1/5}^{3} \left(5 - \frac{1}{x}\right) dx$

$\frac{d}{dx} \ln x = \frac{1}{x}$

$\ln 5^{-1} = -\ln 5$

$\Big[5x - \ln x \Big]_{1/5}^{3}$

$(5(3) - \ln 3) - (5(\tfrac{1}{5}) - \ln \tfrac{1}{5})$

$15 - \ln 3 - 1 + \ln 5$

$14 - \ln 3 + \ln 5$

$\ln a + \ln b = \ln(ab)$

10) $14 - \ln 15$

11) $\int_{0}^{\pi/2} 9 \sin x \, dx$

11) ______________