

# Houston Community College

## Mathematics Department

### Calculus II – Math 2414 Test 1 Review

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

**Solve the problem.**

1) Given the function  $y = 3^x$ , find  $dy/dx$  1) \_\_\_\_\_

**MULTIPLE CHOICE.** Choose the one alternative that best completes the statement or answers the question.

Find  $\frac{dy}{dx}$ .

2)  $y = 5^{9x}$  2) \_\_\_\_\_  
A)  $5^{9x} \ln 5$  B)  $9 \cdot 5^{9x} \ln 5$  C)  $9 \cdot 5^{9x}$  D)  $9 \cdot 5^{9x} \ln 9$

3)  $y = \log_{10} e^x$  3) \_\_\_\_\_  
A)  $\frac{1}{\ln 10}$  B)  $\frac{1}{e^x \ln 10}$  C)  $\frac{\ln 10}{e^x}$  D)  $\frac{1}{\log_{10} x}$

4)  $y = \log_7(x^2 - 8x - 4)$  4) \_\_\_\_\_  
A)  $\frac{2x - 8}{(x^2 - 8x - 4) \ln 7}$  B)  $\frac{(2x - 8) \ln 7}{(x^2 - 8x - 4)}$   
C)  $\frac{2x - 8}{(x^2 - 8x - 4)}$  D)  $\frac{1}{(x^2 - 8x - 4) \ln 7}$

**Evaluate the integral.**

5)  $\int_1^{\sqrt{2}} x^4 x^2 dx$  5) \_\_\_\_\_  
A)  $\frac{4}{\ln 4}$  B)  $\frac{6}{\ln 4}$  C) 6 D)  $\frac{4\sqrt{2} - 4}{2 \ln 4}$

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

**Solve the problem.**

6) Given the function  $y = x^{2x}$ , find  $dy/dx$  by logarithmic differentiation. 6) \_\_\_\_\_

7) Find  $\lim_{x \rightarrow \infty} \frac{5x - 6}{3x - 4}$ . Apply l'Hopital's rule 7) \_\_\_\_\_

8) Find  $\lim_{x \rightarrow 0} \frac{1 - \sec x}{x^3}$ . Apply l'Hopital's rule as many times as necessary. 8) \_\_\_\_\_

9) Find  $\lim_{x \rightarrow 0} x(\tan x)$ .

9) \_\_\_\_\_

**MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.**

Find  $\frac{dy}{dx}$ .

10)  $y = -\sin^{-1}(5x^2 + 4)$

10) \_\_\_\_\_

A)  $\frac{10x}{1 + (5x^2 + 4)^2}$

B)  $\frac{-10x}{\sqrt{1 - (5x^2 + 4)^2}}$

C)  $\frac{10x}{\sqrt{1 - (5x^2 + 4)^2}}$

D)  $\frac{5}{\sqrt{1 + (5x^2 + 4)^2}}$

11)  $y = -\cos^{-1}\left(\frac{14x + 11}{5}\right)$

11) \_\_\_\_\_

A)  $\frac{14}{\sqrt{25 - (14x + 11)^2}}$

B)  $\frac{14}{1 + (14x + 11)^2}$

C)  $\frac{70}{\sqrt{1 + (14x + 11)^2}}$

D)  $-\frac{14}{\sqrt{25 - (14x + 11)^2}}$

12)  $y = 4(\cos^{-1} 2x)^2$

12) \_\_\_\_\_

A)  $8 \cos^{-1} 2x$

B)  $\frac{2 \cos^{-1} 2x}{\sqrt{1 - 4x^2}}$

C)  $\frac{-16 \cos^{-1} 2x}{\sqrt{1 - 4x^2}}$

D)  $\frac{-16}{\sqrt{1 - 4x^2}}$

**Evaluate the integral.**

13)  $\int \frac{dx}{\sqrt{64 - x^2}}$

13) \_\_\_\_\_

A)  $\cos^{-1} \frac{1}{8}x + C$

B)  $\frac{1}{2} \sin^{-1} \frac{1}{8}x + C$

C)  $2 \cos^{-1} \frac{1}{8}x + C$

D)  $\sin^{-1} \frac{1}{8}x + C$

14)  $\int \frac{dx}{x\sqrt{4x^2 - 49}}$

14) \_\_\_\_\_

A)  $\frac{2}{7} \sec^{-1}\left(\frac{2}{7}|x|\right) + C$

B)  $\frac{2}{7} \sin^{-1} \frac{2}{7}\left(\frac{2}{7}x\right) + C$

C)  $\frac{1}{2} \sin^{-1}\left(\frac{2}{7}x\right) + C$

D)  $\frac{1}{7} \sec^{-1}\left(\frac{2}{7}|x|\right) + C$

15)  $\int \frac{dx}{36 + x^2}$

15) \_\_\_\_\_

A)  $\frac{1}{6} \tan^{-1} 6x + C$

B)  $\frac{1}{6} \tan^{-1} \frac{x}{6} + C$

C)  $6 \tan^{-1} \frac{x}{6} + C$

D)  $\frac{1}{6} \tan^{-1}(x + 6) + C$

16)  $\int \frac{dx}{x^2 + 6x + 18}$

16) \_\_\_\_\_

A)  $\frac{1}{3} \tan^{-1} \left( \frac{x+3}{3} \right) + C$

B)  $\sin^{-1} (x+3) + C$

C)  $(2x+6) \ln |x^2 + 6x + 18| + C$

D)  $\frac{1}{3} \sin^{-1} \left( \frac{x+3}{3} \right) + C$

17)  $\int \frac{dx}{(x+2)\sqrt{x^2 + 4x + 3}}$

17) \_\_\_\_\_

A)  $\csc^{-1} |x+2| + C$

B)  $\sec^{-1} |x+2| + C$

C)  $\frac{\sin^{-1} (x+2)}{2} + C$

D)  $\frac{\sec^{-1} |x+2|}{2} + C$

18)  $\int_2^{2\sqrt{7}} \frac{dt}{\sqrt{t^2 - 4t + 8}}$

18) \_\_\_\_\_

A)  $\frac{\pi}{12}$

B)  $\frac{\pi}{10} + \frac{\sqrt{3}}{2}$

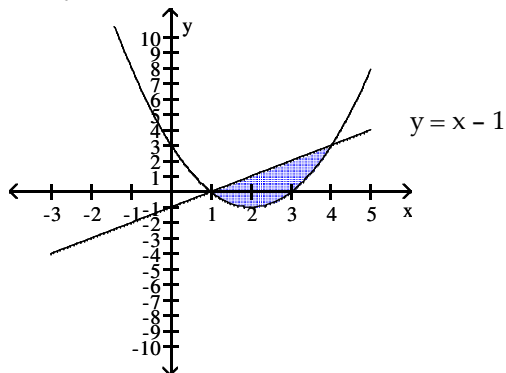
C)  $\frac{\pi}{6}$

D) Undefined

Find the area of the shaded region.

19)  $y = x^2 - 4x + 3$

19) \_\_\_\_\_



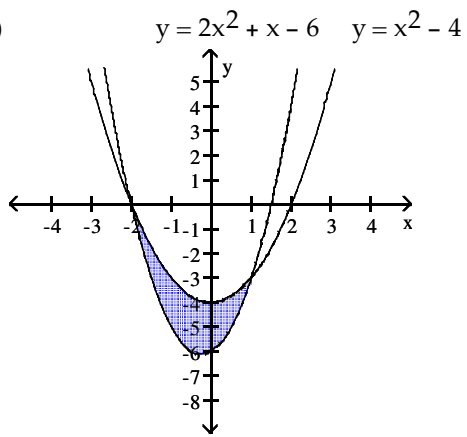
A)  $\frac{25}{6}$

B) 3

C)  $\frac{41}{6}$

D)  $\frac{9}{2}$

20)



20) \_\_\_\_\_

A)  $\frac{11}{6}$

B)  $\frac{19}{3}$

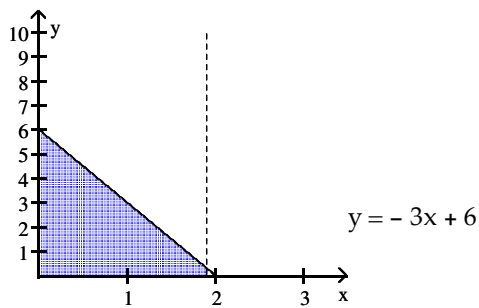
C)  $\frac{9}{2}$

D)  $\frac{8}{3}$

Find the volume of the solid generated by revolving the shaded region about the given axis.

21) About the x-axis

21) \_\_\_\_\_



A)  $48\pi$

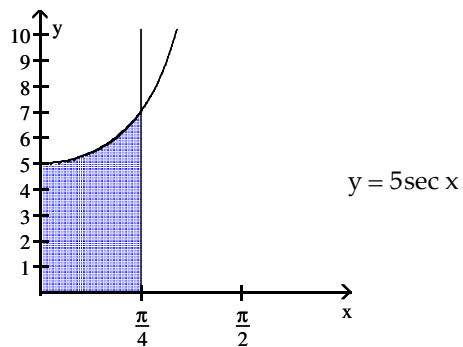
B)  $24\pi$

C)  $18\pi$

D)  $168\pi$

22) About the x-axis

22) \_\_\_\_\_



A)  $\frac{35}{2}\pi$

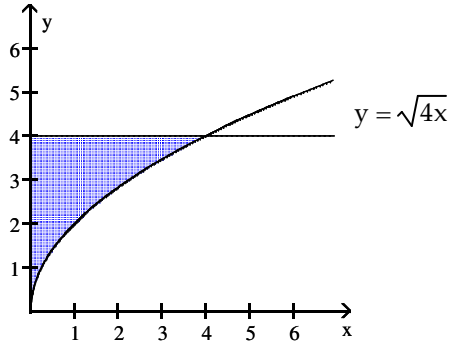
B)  $25\pi$

C)  $\frac{25}{2}\pi$

D)  $5\pi$

23) About the y-axis

23) \_\_\_\_\_



A)  $\frac{16}{3}\pi$

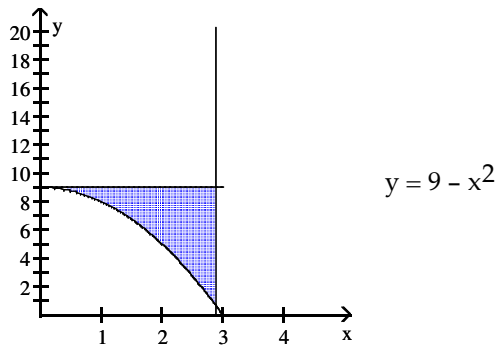
B)  $\frac{64}{5}\pi$

C)  $\frac{1024}{5}\pi$

D)  $32\pi$

24) About the x-axis

24) \_\_\_\_\_



A)  $\frac{648}{5}\pi$

B)  $\frac{567}{5}\pi$

C)  $\frac{162}{5}\pi$

D)  $9\pi$

Find the volume of the solid generated by revolving the region about the y-axis.

25) The region enclosed by  $x = \frac{5}{y}$ ,  $x = 0$ ,  $y = 1$ ,  $y = 4$

25) \_\_\_\_\_

A)  $\frac{15}{4}\pi$

B)  $\frac{75}{16}\pi$

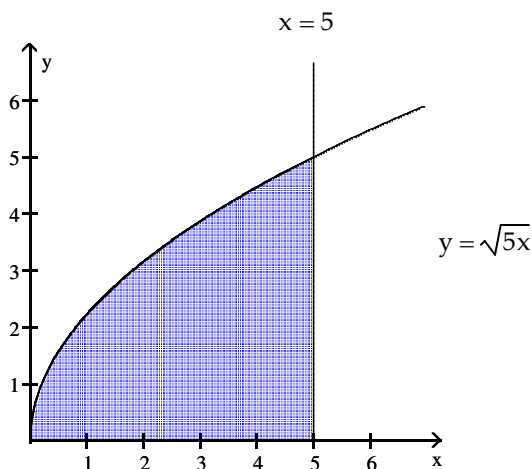
C)  $\frac{125}{4}\pi$

D)  $\frac{75}{4}\pi$

Use the shell method to find the volume of the solid generated by revolving the shaded region about the indicated axis.

26) About the y-axis

26) \_\_\_\_\_



A)  $25\pi$

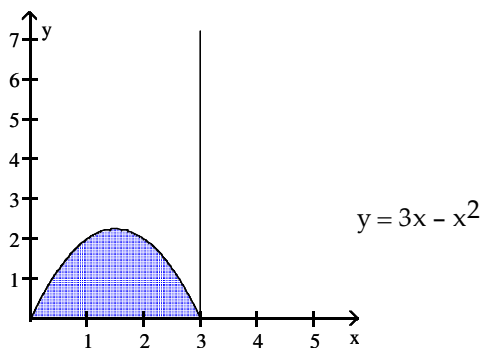
B)  $\frac{100}{3}\pi$

C)  $50\pi$

D)  $100\pi$

27) About the y-axis

27) \_\_\_\_\_



A)  $\frac{81}{8}\pi$

B)  $\frac{27}{4}\pi$

C)  $\frac{27}{2}\pi$

D)  $\frac{81}{4}\pi$

Use the shell method to find the volume of the solid generated by revolving the region bounded by the given curves about the given lines.

28)  $y = 3x$ ,  $y = x^2$ ; revolve about the y-axis

28) \_\_\_\_\_

A)  $-\frac{27}{2}\pi$

B)  $\frac{27}{4}\pi$

C)  $\frac{27}{2}\pi$

D)  $\frac{189}{2}\pi$

Find the length of the curve.

29)  $y = 2x^{3/2}$  between  $x = 0$  to  $x = \frac{5}{4}$

29) \_\_\_\_\_

A)  $\frac{9}{4}$

B)  $\frac{335}{108}$

C)  $\frac{335}{72}$

D)  $\frac{335}{3}$

30)  $x = \frac{2}{3}(y - 1)^{3/2}$  between  $y = 16$  to  $y = 25$

30) \_\_\_\_\_

A)  $\frac{183}{2}$

B) 61

C)  $\frac{122}{3}$

D) 4

E)  $\frac{109}{3}$