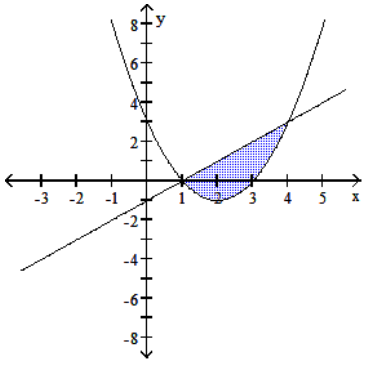
Practice Test 1 - Calculus II - Spring 2018

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question. Write your choice in the space provided. No partial credit.

Find the area of the shaded region.

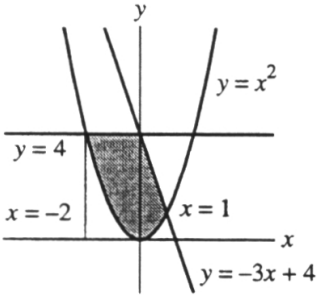
1) $y = x^2 - 4x + 3$ 1) _____



$y = x - 1$

A) $\frac{41}{6}$ B) 3 C) $\frac{25}{6}$ D) $\frac{9}{2}$

2) Refer to the information in the graph below. Set up a definite integral or sum of definite integrals that gives the area of the shaded portion. 2) _____



A) $\int_{-2}^{-3x+4} (4 - x^2)\,dx$

B) $\int_{-2}^{0} (4 - x^2)\,dx + \int_{0}^{1} [4 - (-3x + 4)]\,dx$

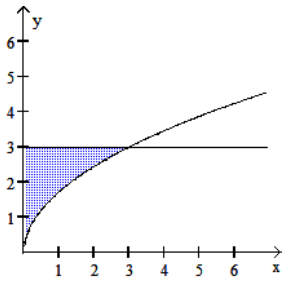
C) $\int_{-2}^{0} (4 - x^2)\,dx + \int_{0}^{1} (-3x + 4 - x^2)\,dx$

D) $\int_{-2}^{1} [4 + (-3x + 4) - x^2]\,dx$

E) none of these

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

3) About the y-axis 3) _____



$y = \sqrt{3x}$

A) $\frac{243}{5}\pi$ B) 3π C) $\frac{27}{5}\pi$ D) 18π

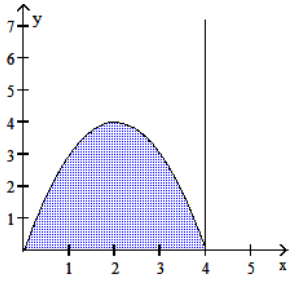
Find the volume of the solid generated by revolving the region bounded by the given lines and curves about the x-axis.

4) $y = -7x + 14$, $y = 7x$, $x = 0$ 4) _____

A) 49π B) 98π C) 14π D) 294π

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

5) About the y-axis 5) _____

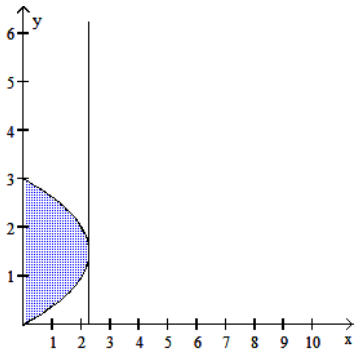


$y = 4x - x^2$

A) 64π B) $\frac{128}{3}\pi$ C) 32π D) $\frac{64}{3}\pi$

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

6) About the line y = -1 6) _____



$x = 3y - y^2$

A) $\frac{45}{4}\pi$ B) $\frac{45}{2}\pi$ C) $\frac{27}{2}\pi$ D) $\frac{135}{2}\pi$

Set up an integral for the length of the curve.

7) $y = 7 \cot x, \frac{\pi}{4} \le x \le \frac{\pi}{2}$ 7) _____

A) $\int_{\pi/4}^{\pi/2} \sqrt{1 + 49 \csc^2 x}\, dx$ B) $\int_{\pi/4}^{\pi/2} \sqrt{1 + 7 \csc^2 x}\, dx$

C) $\int_{\pi/4}^{\pi/2} \sqrt{1 + 49 \csc^4 x}\, dx$ D) $\int_{\pi/4}^{\pi/2} \sqrt{1 - 49 \csc^2 x}\, dx$

Solve the problem.

8) Find a curve through the point (-8, 1) whose length integral, $1 \le y \le 2$, is $L = \int_1^2 \sqrt{1 + \frac{16}{y^3}}\, dy$. 8) _____

A) $x = \frac{-8}{\sqrt{y}}$ B) $x = \frac{4}{\sqrt{y}}$ C) $x = -8y^{5/2}$ D) $x = -8\sqrt{y}$

Set up an integral for the area of the surface generated by revolving the given curve about the indicated axis.

9) $xy = 5,\ 3 \le y \le 4;$ y-axis 9) _____

A) $10\pi \int_3^4 \frac{1}{y} \sqrt{1 + 25y^{-4}}\, dy$ B) $5\pi \int_3^4 \frac{1}{y} \sqrt{1 + 25y^{-4}}\, dy$

C) $5\pi \int_3^4 \frac{1}{y} \sqrt{1 + 5y^{-4}}\, dy$ D) $10\pi \int_3^4 \frac{1}{y} \sqrt{1 + 5y^{-4}}\, dy$

Solve the problem.

10) A force of 1300 lb compresses a spring from its natural length of 19 in. to a length of 12 in. How much work is done in compressing it from 12 in. to 9 in.? 10) _____

A) 9500 in.-lb B) 4700 in.-lb C) 840 in.-lb D) 0.14 in.-lb

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question. Write your answer in the space provided. No partial credit.

Find the centroid of the thin plate bounded by the graphs of the given functions. Use density = 1 and Mass = area of the region covered by the plate.

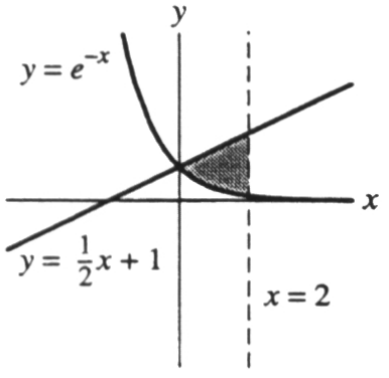
11) $g(x) = x^2$ and $f(x) = x + 12$ 11) _____

Evaluate the integral.

12) $\int x^4 \ln 4x \, dx$ 12) _____

ESSAY. Show all work to justify your answer. Answers with no work or insufficient work will receive no credit. Partial credit may be given.

13) Use the graph below to determine the area of the shaded region.



Find the volume of the described solid.

14) The base of the solid is the disk $x^2 + y^2 \leq 25$. The cross sections by planes perpendicular to the y-axis between $y = -5$ and $y = 5$ are isosceles right triangles with one leg in the disk.

Solve the problem.

15) Find the volume of the solid generated by revolving the region bounded by the curve $y = \ln x$, the x-axis, and the vertical line $x = e^2$ about the x-axis.

16) A vertical right circular cylindrical tank measures 28 ft high and 14 ft in diameter. It is full of oil weighing 60 lb/ft^3. How much work does it take to pump the oil to a level 2 ft above the top of the tank? Give your answer to the nearest ft · lb. You only need to set up the integral to find the work done. You do not need to evaluate the integral.

17) A right triangular plate of base 8 m and height 4 m is submerged vertically, as shown below. Find the force on one side of the plate if the top vertex is 1 m below the surface. (fluid density = 9800 N/m^3). You only need to set up the integral to find the force. You do not need to evaluate the integral.