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<td><strong>H1</strong>: Worksheets “Area Functions” - show work/reasoning for each problem</td>
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| 3/17   | Area between Curves                        | 6.1      | **H2**: Read section 6.1  
Do: pp. 361 - 362 #1 - 45 every other odd                                                                                           |
| 3/19   | Integral as Net Change                     | 5.5, 6.2 | **H3**: Read sections 5.5 and 6.2  
Do: pp. 326 - 327 #3 - 19 every other odd; #21 pp. 372 - 373 #9 - 15 odd                                           |
| 3/23   | Volume of Solids of Revolution             | 6.3      | **H4**: Read section 6.3  
Do: pp. #381 - 382 #3 - 51 every other odd                                                                                     |
| 3/25   | Quiz 8B                                     | 5.5      | **H5**: Preliminary Questions - p. 326 #1 - 3 all; p. 361 #1 - 4 all; p. 372 #1, 2, and 5; p. 381 #1 - 4 all  |
| 3/27   | Group FRQs - unit 8 Review for Test 9       | 6.1 - 6.3| **H6**: Quiz 8A corrections on a separate sheet of looseleaf with work  
**H7**: Quiz 8B corrections on a separate sheet of looseleaf with work  
**H8**: Review for test - AP style MCQs - show detailed work/reasoning for each problem  
p. APC5-3 #19; p. APC6-1 #1 - 3 all; p. APC6-2 #8-11 and #13 - 15; p. APC6-3 #17 and 18 |
| 3/31   | TEST 8                                      | 5.5, 6.1 - 6.3 | **Deadline for Set H Assignments**                                                                                       |
For each problem below, sketch the region in question labeling ordered pairs at points of intersection, draw a representative rectangle, write the definite integral(s), and find the exact area where possible.

1. Find the area of the region bounded by the equations by integrating with respect to y.

\[ x = 36 - y^2 \]
\[ x = y - 6 \]
A) \( A = \frac{1099}{6} \)  
B) \( A = \frac{2197}{6} \)  
C) \( A = \frac{2197}{12} \)  
D) \( A = \frac{1099}{12} \)  
E) \( A = \frac{2195}{12} \)

2. Find the area of the region bounded by equations by integrating (i) with respect to x

\[ y = x^2 \]
\[ y = 72 - x \]
A) \( A = \frac{1637}{4} \)  
B) \( A = \frac{819}{2} \)  
C) \( A = \frac{4913}{12} \)  
D) \( A = \frac{819}{4} \)  
E) \( A = \frac{4913}{6} \)

3. Find the area of the region bounded by the graphs of the equations.

\[ f(x) = \frac{16x}{x^2 + 1}, \quad y = 0, \quad 0 \leq x \leq 8 \]
A) \( A = 8 \ln(65) \)  
B) \( A = 8 \ln(63) \)  
C) \( A = 65 \ln(8) \)  
D) \( A = 63 \ln(8) \)  
E) None of the above

4. Find the area of the region bounded by the graphs of the equations.

\[ f(x) = \sin(2x), \quad g(x) = \cos(x), \quad -\frac{\pi}{2} \leq x \leq \frac{\pi}{6} \]
A) \( A = \frac{3\sqrt{2}}{8} \)  
B) \( A = \frac{3\sqrt{2}}{2} \)  
C) \( A = \frac{9\sqrt{2}}{8} \)  
D) \( A = \frac{9\sqrt{2}}{2} \)  
E) None of the above

5. Find the area of the region bounded by the graphs of the equations.

\[ f(x) = xe^{-x^2}, \quad y = 0, \quad 0 \leq x \leq 1 \]
A) \( A = \frac{e-1}{4} \)  
B) \( A = \frac{1-e^{-1}}{4} \)  
C) \( A = \frac{e-1}{3} \)  
D) \( A = \frac{e-1}{2e} \)  
E) \( A = \frac{e+1}{4} \)
6. The graph of the function \( f \) shown above consists of a semicircle and three line segments. Let \( g \) be the function given by \( g(x) = \int_{-3}^{x} f(t) \, dt \).

(a) Find \( g(0) \) and \( g'(0) \).

(b) Find all values of \( x \) in the open interval \((-5, 4)\) at which \( g \) attains a relative maximum. Justify your answer.

(c) Find the absolute minimum value of \( g \) on the closed interval \([-5, 4]\). Justify your answer.

(d) Find all values of \( x \) in the open interval \((-5, 4)\) at which the graph of \( g \) has a point of inflection.

For #7-10, you must sketch and shade the region, write the integral, and find the volume of the solid.

7. Find the volume of the solid generated by revolving the region in the first quadrant bounded above by the line \( y = 2 \), below by the curve \( y = 2 \sin x \), and on the left by the \( y \)-axis about the line \( y = 2 \).

8. Find the volume of the solid generated by revolving the region enclosed by \( x = y^{3/2}, \ x = 0, \ \text{and} \ \ y = 2 \) about the \( y \)-axis.

9. The base of a solid is the region between the line \( y = 4 \) and the parabola \( y = x^2 \). The cross-sections perpendicular to the \( x \)-axis are semicircles. Find the volume of the solid.

10. A region is bounded by the curves \( y = \sqrt{x}, \ y = x - 2, \ \text{and} \ \ y = 0 \). Find the volume of the solid generated by rotating this region about the \( x \)-axis.
Directions: For each multiple choice problem below, show detailed work and/or reasoning in the space provided.

1. (calculator not allowed)
   The region enclosed by the x-axis, the line $x = 3$, and the curve $y = \sqrt{x}$ is rotated about the x-axis.
   What is the volume of the solid generated?
   
   (A) $3\pi$
   (B) $2\sqrt{3}\pi$
   (C) $\frac{9}{2}\pi$
   (D) $9\pi$
   (E) $\frac{36\sqrt{3}}{5}\pi$

2. (calculator not allowed)
   The area of the region bounded by the lines $x = 0$, $x = 2$, and $y = 0$ and the curve $y = e^x$ is
   
   (A) $\frac{e-1}{2}$
   (B) $e-1$
   (C) $2(e-1)$
   (D) $2e-1$
   (E) $2e$

3. (calculator not allowed)
   The region bounded by the x-axis and the part of the graph of $y = \cos x$ between $x = -\frac{\pi}{2}$ and $x = \frac{\pi}{2}$
   is separated into two regions by the line $x = k$. If the area of the region for $-\frac{\pi}{2} \leq x \leq k$ is three times
   the area of the region for $k \leq x \leq \frac{\pi}{2}$, then $k =$
   
   (A) $\arcsin \left( \frac{1}{4} \right)$
   (B) $\arcsin \left( \frac{1}{3} \right)$
   (C) $\frac{\pi}{6}$
   (D) $\frac{\pi}{4}$
   (E) $\frac{\pi}{3}$
sections: For each multiple choice problem below, show detailed work and/or reasoning in the space provided.

4. (calculator allowed)
The base of a solid is the region in the first quadrant bounded by the y-axis, the graph of \( y = \tan^{-1} x \), the horizontal line \( y = 3 \), and the vertical line \( x = 1 \). For this solid, each cross section perpendicular to the x-axis is a square. What is the volume of the solid?

(A) 2.561  
(B) 6.612  
(C) 8.046  
(D) 8.755  
(E) 20.773

5. (calculator allowed)
What is the area enclosed by the curves \( y = x^3 - 8x^2 + 18x - 5 \) and \( y = x + 5 \)?

(A) 10.667  
(B) 11.833  
(C) 14.583  
(D) 21.333  
(E) 32

6. (calculator allowed)

![Graph of a function f(x)](image)

The regions \( A, B, \) and \( C \) in the figure above are bounded by the graph of the function \( f \) and the \( x - axis \). If the area of each region is 2, what is the value of \( \int_{-3}^{5} (f(x) + 1) \, dx \)?

(A) -2  
(B) -1  
(C) 4  
(D) 7  
(E) 12
Free Response

7. (calculator allowed)

In the figure above, $R$, is the shaded region in the first quadrant bounded by the graph of $y = 4 \ln(3-x)$, the horizontal line $y = 6$, and the vertical line $x = 2$.

(a) Find the area of $R$.

(b) Find the volume of the solid generated when $R$ is revolved about the horizontal line $y = 8$.

(c) The region $R$ is the base of a solid. For this solid, each cross section perpendicular to the $x$-axis is a square. Find the volume of the solid.