1. (1 pt) Sketch the region enclosed by $y = 6x$ and $y = 5x^2$. Decide whether to integrate with respect to $x$ or $y$. Then find the area of the region.

2. (1 pt) Sketch the region enclosed by $y = e^{4x}$, $y = e^{8x}$, and $x = 1$. Decide whether to integrate with respect to $x$ or $y$. Then find the area of the region.

3. (1 pt) Sketch the region enclosed by the given curves. Decide whether to integrate with respect to $x$ or $y$. Then find the area of the region.

   $y = 4x^2, y = x^2 + 3$

4. (1 pt) Sketch the region enclosed by $x + y^2 = 12$ and $x + y = 0$. Decide whether to integrate with respect to $x$ or $y$. Then find the area of the region.

5. (1 pt) Sketch the region enclosed by the given curves. Decide whether to integrate with respect to $x$ or $y$. Then find the area of the region.

   $y = 4\cos x, \quad y = (5\sec(x))^2, \quad x = -\pi/4, \quad x = \pi/4$

6. (1 pt) Sketch the region enclosed by the given curves. Decide whether to integrate with respect to $x$ or $y$. Then find the area of the region.

   $2y = 4\sqrt{x}, y = 5, \quad 2y + 2x = 6$

7. (1 pt) Find the area between the curves:

   $y = x^3 - 11x^2 + 30x$

   and $y = -x^3 + 11x^2 - 30x$

8. (1 pt) The total area enclosed by the graphs of

   $y = 6x^2 - x^3 + x$

   $y = x^2 + 5x$

is

9. (1 pt) Find the area enclosed between $f(x) = 0.1x^2 + 10$ and $g(x) = x$ from $x = -5$ to $x = 6$.

10. (1 pt) Find the area of the region enclosed between $y = 4\sin(x)$ and $y = 4\cos(x)$ from $x = 0$ to $x = 1\pi$.

    Hint: Notice that this region consists of two parts.

11. (1 pt) Use the parametric equations of an ellipse,

    $x = 6\cos(\theta), \quad y = 6\sin(\theta), \quad 0 \leq \theta \leq 2\pi$,

    to find the area that it encloses.

12. (1 pt) Use the parametric equations of an ellipse

    $x = 12\cos\theta$

    $y = 21\sin\theta$

    $0 \leq \theta \leq 2\pi$

    to find the area that it encloses.

13. (1 pt) Find the area of the region enclosed by the parametric equation

    $x = t^3 - 3t$

    $y = 4t^2$

14. (1 pt) There is a line through the origin that divides the region bounded by the parabola $y = 3x - 8x^2$ and the $x$-axis into two regions with equal area. What is the slope of that line?

15. (1 pt) Farmer Jones, and his wife, Dr. Jones, decide to build a fence in their field, to keep the sheep safe. Since Dr. Jones is a mathematician, she suggests building fences described by $y = 6x^2$ and $y = x^2 + 12$. Farmer Jones thinks this would be much harder than just building an enclosure with straight sides, but he wants to please his wife. What is the area of the enclosed region?
16. (1 pt) Note: You can get full credit for this problem by just answering the last question correctly. The initial questions are meant as hints towards the final answer and also allow you the opportunity to get partial credit.

Find the area bounded by the two curves:

\[ x = 100000 \left( 12 \sqrt{y} - 1 \right) \]

\[ x = 100000 \left( \frac{12 \sqrt{y} - 1}{9 \sqrt{y}} \right) \]

The appropriate definite integral for computing this area has integrand

lower limit of integration = ___ ;

and upper limit of integration = ___ ;

This definite integral has value = ___.

This is the area of the region enclosed by the two curves.

17. (1 pt) Consider the area between the graphs \( x + 4y = 5 \) and \( x + 7 = y^2 \). This area can be computed in two different ways using integrals.

First of all it can be computed as a sum of two integrals

\[ \int_a^b f(x) \, dx + \int_b^c g(x) \, dx \]

where \( a = \) ___ , \( b = \) ___ , \( c = \) ___ and \( f(x) = \) ___ and \( g(x) = \) ___.

Alternatively this area can be computed as a single integral

\[ \int_{\alpha}^{\beta} h(y) \, dy \]

where \( \alpha = \) ___ , \( \beta = \) ___ and \( h(y) = \) ___.

Either way we find that the area is ___.

18. (1 pt) Find \( c > 0 \) such that the area of the region enclosed by the parabolas \( y = x^2 - c^2 \) and \( y = c^2 - x^2 \) is 160.

\( c = \) ___.