Group Work 1, Section 6.1
Practice with Areas

For each of the following problems, first sketch the relevant area, then write out the definite integral that will give its exact value.

1. The area bounded by $y = 2^x$, $y = 8$, and the y-axis.

2. The area bounded by $y = 3^x$, $x = 2$, the x-axis, and the y-axis.

3. The area in the first quadrant between $x^2 + y^2 = 1$ and $x^{1/2} + y^{1/2} = 1$.

4. The area in the first quadrant bounded by the curves $\dfrac{x^2}{9} + \dfrac{y^2}{4} = 1$ and $x = -\dfrac{y^2}{4} + 1$.

5. The area between the curves $y = \cos x$ and $y = \frac{1}{2}x - 1$, bounded on the left by the y-axis.

6. The area bounded by the curves $y = x^2 - 4$ and $y = \begin{cases} \frac{1}{2}x + 1 & \text{if } x \leq 0 \\ -\frac{1}{2}x + 1 & \text{if } x > 0 \end{cases}$