Section 2 Review

1. Write the following integral without using absolute value. (Do not integrate.)

$$\int_0^4 \left| x^2 - x - 2 \right| dx$$

2. Write integrals for the following areas without using absolute value. (Do not integrate.)

   (a) Area enclosed by $y = x^2 + 2$ and $y = 5x - 4$.

   (b) Area enclosed by $y = 2 - x$ and $y = 2x - 1$ and $x = -1$.

   (c) Area between $y = x^2 + 1$ and $y = 3x + 1$ from $x = 1$ to $x = 5$.

3. Write integrals for the following volumes of rotation. Do not use absolute value. Do not integrate.

   (a) Region inside $y = 4 - x$ and $y = 2x + 1$ and $x = 3$ rotated around the x-axis.

   (b) Region inside $y = 4 - x$ and $y = 2x + 1$ and $x = 3$ rotated around the y-axis.

   (c) Region inside $y = 4 - x$ and $y = 2x + 1$ and $x = 3$ rotated around the line $x = 4$.

   (d) Region inside $y = 4 - x$ and $y = 2x + 1$ and $x = 3$ rotated around the line $y = 1$.

4. Write integrals for the following arc length and surface areas.

   (a) Arc length of $x^2y = 4$ from $(1, 4)$ to $(2, 1)$.

   (b) Surface area when arc above is rotated around x-axis.

   (c) Surface area when arc above is rotated around y-axis.

   (d) Surface area when arc above is rotated around line $y = 5$.

   (e) Surface area when arc above is rotated around line $x = 3$.

Challenge Problems

1. Write integrals computing the area between $y - 2x = 4$, $y + x = 2$, and $y = -2$...

   (a) ... using integrals dx.

   (b) ... using integrals dy.

2. Write integrals computing the volume when the region enclosed by $y = 4x^2$ and $y = \sqrt{x}$ is rotated around the line $x = -1$...

   (a) ... using integrals dx.

   (b) ... using integrals dy.