Exam 1-050

3. For these problems, you are asked to provide figures. The figure should clearly indicate which of dx or dy plays the role of thickness of the infinitesimal object (cross-section or shell). Examples of such figures are found on pp. 441–443, 451–453 of the text.

4. Complete the square.

5. See CC 10.

Exam 1-080

2. Complete the square, and use the formula given in the exam.

3. See comment on problem 3 of exam 1-050, above.

Exam 1-100

1. Off-hand, the expansion has three terms, not only two. One is zero by reason of symmetry (the integrand is an even function of x). Assuming the presence of only two terms without explanation is not considered a satisfactory solution.

4. Each of these solids is a solid of revolution, where y and $y + 2$ are the distance in each case from the point (x, y) to the axis of revolution. What is the equation of each axis? As for illustrating, since you are asked to describe and sketch, see the comment on problem 3 of exam 1-050.

5. See CC 6.

6. The correct start is $W = \int dW$ where $dW = \text{distance} \cdot dF$, $dF = 62.5dV$, dV being the infinitesimal volume of a cross-section of thickness dz. The cross-section is made of points which travel an equal distance. Part of your solution is to relate z (plot the z-axis and its origin) to the given coördinates x, y (in this case, z is related to y only).

Exam 2-050

1. $\cos(n\pi) = ?$

2.b) When performing a trigonometric substitution, the solution is not complete unless you specify the interval of the arc θ. See CC 9.

3. The surface is obtained by rotating half of the curve, corresponding either to $y \geq 0$ or $y \leq 0$. On such an arc, $y = y(x)$ but also $x = x(y)$. You may choose then to integrate wrt x, or wrt y. See problem 12 of quiz.

5.

   (a) The function $x \longmapsto 1/(1 + x)$ is continuous. Note that this sequence stays positive, as trouble occurs if some $a_n = -1$.

   (b) Each digit does not exceed nine, and there is a comparison principle for series.

Exam 2-080

1. If you made the correct choice in part (a) (see Stewart p.697), then by letting $r = 1$, there

holds $a_n > b_n$ for n large enough, and (b) follows by comparison. (c) follows in turn by comparing the given series with the harmonic series, and using

$$\frac{x}{\ln(x)} \to \infty \text{ as } x \to \infty$$

3.b) See comment on previous exam.

5.b) Squeeze theorem.

6. Refer to the figure we used to establish the validity of the integral test.

Exam 2-100

2.b) $x^5 + 2 > x^5$.

4.a) Factor one-half.