1. If $f(1) = 1$, $f(1.5) = 3$, $f(2) = 1$, $f(2.5) = -1$, $f(3) = -2$,

the approximate value of $\int_1^3 f(x)\,dx$ given by Simpson's Rule is

(A) $\frac{5}{4}$ (B) 2 (C) $\frac{4}{3}$ (D) $\frac{7}{6}$ (E) $\frac{3}{2}$

2. The area of the region between the graphs of

$y = 1 - 5x + 2x^2$ and $y = 1 + x - x^2$ is

(A) $\frac{9}{2}$

(B) 4

(C) $\frac{13}{3}$

(D) 5

(E) $\frac{25}{6}$

3. The area of the region between the graphs of $x = y^3 - y$ and $x = 1 - y^4$ is

(A) $\frac{8}{5}$

(B) 2

(C) $\frac{3}{2}$

(D) $\frac{5}{3}$

(E) $\frac{11}{6}$

4. The base of a solid is the region bounded by the parabolas $y = x^2$ and $y = 2 - x^2$. The cross-sections perpendicular to the x-axis are squares with one side lying along the base. Find the volume of the solid.

(A) $\int_{-1}^{1} \pi (1 - x^2)^4 \, dx$

(B) $\int_{-1}^{1} (1 - x^2)^2 \, dx$

(C) $\int_{-1}^{1} \frac{\sqrt{3}}{4} (1 - x^2)^3 \, dx$

(D) $\int_{-1}^{1} 4 (1 - x^2)^2 \, dx$

(E) $\int_{-1}^{1} 2 (1 - x^2) \, dx$

5. Let R be the region (in the 1st quadrant) bounded by the graphs of $y = x$, $y = \frac{1}{x}$, $x = 2$ and $x = 3$. Find the volume of the solid obtained by revolving R about the x–axis.

(A) $\frac{19}{3}\pi$ (B) 6π (C) $\frac{37}{6}\pi$ (D) $\frac{13}{2}\pi$ (E) $\frac{32}{5}\pi$

6. The volume of the solid generated by revolving the shaded region about the x–axis is

(A) $\frac{11\pi}{4}$

(B) $\frac{5\pi}{2}$

(C) 3π

(D) $\frac{8}{3}\pi$

(E) $\frac{17}{6}\pi$

7. The volume of the solid generated by revolving the region between the x–axis and the curve $y = x^2 - 2x$ about the line $x = 2$ is given by the integral

(A) $\int_0^2 \pi \left[2 - \left(x^2 - 2x\right)\right]^2 dx$

(B) $\int_0^2 2\pi (2 - x)(2x - x^2)\, dx$

(C) $\int_0^2 \pi \left(2x - x^2\right)^2 dx$

(D) $\int_0^2 2\pi x \left(2x - x^2\right) dx$

(E) $\int_0^2 \pi \left(2x - x^2\right) dx$

8. The length of the curve $x = \frac{2}{3}(y - 1)^{3/2}$ from $y = 1$ to $y = 4$ is

(A) $\frac{29}{6}$ (B) $\frac{17}{4}$ (C) $\frac{9}{2}$ (D) $\frac{24}{5}$ (E) $\frac{14}{3}$

9. Find the length of the curve $y = \frac{4}{5} x^{5/4}$ from $x = 0$ to $x = 9$.

(Hint: to evaluate the resulting integral, make a bold u–substitution)

(A) $\frac{108}{7}$ (B) $\frac{76}{5}$ (C) $\frac{232}{15}$ (D) $\frac{95}{6}$ (E) $\frac{325}{21}$

10. The area of the surface generated by revolving the curve $y = x^2$ for $0 \leq x \leq 2$ about the x–axis is

(A) $\int_0^2 2\pi x^2 \sqrt{1 + 4x^2}\, dx$

(B) $\int_{0}^{2} 2\pi x \sqrt{1 + x^4}\, dx$

(C) $\int_{0}^{2} 2\pi x^2 \sqrt{1 + 2x}\, dx$

(D) $\int_{0}^{2} 2\pi x \sqrt{1 + 4x^2}\, dx$

(E) $\int_{0}^{2} 2\pi x^2 \sqrt{1 + x^4}\, dx$