Math 232 Calculus 2 Fall 21 Sample midterm 1

(1) Find $\displaystyle\int \frac{\sin x}{1-\cos x}\,dx$.

(2) Find $\displaystyle\int \frac{\sin x}{1-\cos^2 x}\,dx$.

(3) Find the area between the two curves $y = \cot(x)$ and $y = 2\cos(x)$ on the interval $[1/4, 1]$.

(4) Consider the ellipsoid $9x^2 + 9y^2 + z^2 = 16$.
   (a) Write down a formula for the area of the vertical cross sections perpendicular to one of the axes. Hint: choose an axis which makes this easier.
   (b) Use your answer above to find the volume of the ellipsoid.

(5) Find the average value of e^{-2x} on the interval $[0, 4]$.

(6) Use discs to find the volume of the object formed by rotating the triangle with vertices $(1, 0), (1, 2)$ and $(3, 0)$ about the x-axis.

(7) Find the volume of the sphere of radius R by rotating the semicircle bounded by $x^2 + y^2 = R^2$ about the y-axis, using cylindrical shells.

(8) Find $\displaystyle\int x^2 \ln(x-1)dx$.

(9) Find $\displaystyle\int e^{-2x}\sin(3x)dx$.

(10) Find $\displaystyle\int xe^{-x}\cos(x)dx$

(11) Find $\displaystyle\int_0^{\pi/2} \sin^3(x)\cos^2(x)dx$.

(12) Find $\displaystyle\int \sin(6x)\cos(4x)dx$.

(13) Find $\displaystyle\int \frac{x^2}{\sqrt{4x^2+1}}\,dx.$

(14) Find $\displaystyle\int \sqrt{x^2-9}\,dx.$

(15) Find $\displaystyle\int \frac{x}{\sqrt{1-3x^2}}\,dx.$

(16) Find $\displaystyle\int \tan^3 3x\,dx.$

(17) Find $\displaystyle\int \frac{7-x}{(x-2)(x+1)}dx.$

(18) Find $\displaystyle\int_0^1 \frac{1}{4x^2+1}\,dx.$