Math 232 Calculus 2 Spring 18 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 $y = 2\tan(x)$ and $y = \cos(x)$ on the interval $[0, \pi/4]$.

(4) Consider the ellipsoid $x^2 + 4y^2 + 4z^2 = 1$.
    (a) Write down a formula for the area of the vertical cross sections perpendicular to the x-axis for a fixed value of x.
    (b) Use your answer above to find the volume of the ellipsoid.

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

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

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

(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 $\displaystyle\int \sin(4x) \cos(9x)dx$.