Practice Exam 3

March 6, 2009

1 Set up the integral to find the arc length of $y = x\sin(x)$ from 0 to 6π. Approximate this integral by using midpoint rule with $n = 3$.

2 The demand curve of tortillas is $D(x) = 1984 - 12x$ and the supply is $s(x) = 19x$. Find the consumer surplus and the producer surplus for a tortilla selling company.

3 Find the volume of the solid obtained by rotating the region between $y = x\sin 3x$ when x is in the interval $[0, \pi]$ about the $y - axis$.

4 Find the area of the region between $y = x^2 + 7x$ and $y = 12x - 6$.

5 The height of a monument is 20m. A horizontal cross-section at a distance x meters from the top is an rectangle with width $\frac{1}{4}x$ meters and length e^{x^2}. Find the volume of the monument.

6 Find the derivative of the following function:

$$g(x) = \int_{\ln x}^{x^2} \frac{t}{\sqrt{2+t^2}} dt$$

7 Evaluate the following integrals:

$$\int_0^2 \sqrt{4-x^2}\ dx$$

$$\int_1^7 2^x\ dx$$

$$\int (x+1)^2 e^{2x}\ dx$$

$$\int x\sin x\ dx$$

$$\int x^2(x^3-2x+1)^7\ dx$$

8 Find the volume obtained by rotating the region between $y = x^2$ and $y = x$ rotated around $y = 3$.

9 If Superman fought Yoda, who would win and why?