AP Calculus AB
Sample Chapter 7 Test

Name key

Evaluate.

1. $\int 2xe^{x^2}dx$ $u = x^2$ $du = 2x\,dx$

$\int e^u du = e^u + C = e^{x^2} + C$

2. $\int_0^{\sqrt{\left(\frac{\pi}{2}\right)}} \frac{x\cos(x^2)}{\sqrt{\sin(x^2)}}dx$ $u = \sin(x^2)$ $u(\sqrt{\pi/2}) = 1$ $u(0) = 0$

$du = \cos(x^2)\cdot 2x\,dx$ $\frac{1}{2}du = x\cos(x^2)dx$

$\frac{1}{2}\int_0^1 \frac{1}{\sqrt{u}}du = \frac{1}{2}\left(2u^{1/2}\right)\Big|_0^1 = 1^{1/2} - 0^{1/2} = 1$

3. $\int_{\frac{\pi}{4}}^{\frac{\pi}{3}} \sin\theta\cos^3\theta d\theta$ $u = \cos\theta$ $u(\pi/3) = 1/2$ $u(\pi/4) = 1/\sqrt{2}$

$du = -\sin\theta\,d\theta$ $= -du = \sin\theta\,d\theta$

$-\int_{\frac{\sqrt{2}}{2}}^{1/2} u^3\,du = -\frac{u^4}{4}\Big|_{1/\sqrt{2}}^{1/2} = -\frac{1/16}{4} + \frac{1/4}{4} = -\frac{1}{64} + \frac{1}{16}$

4. $\int x^3e^{5x}dx$

can't do @ this time

5. Assume that the median price, P, of a home rose from $50,000 in 1970 to $100,000 in 1990. Let t be the number of years since 1970. Find the median price of a home in 2003, assuming that the housing prices rise exponentially.

(0, 50000) (20, 100000)

$y = 50000e^{kt}$

$100000 = 50000e^{20k}$

$2 = e^{20k}$

$k = \frac{\ln 2}{20}$

$y = 50000e^{\frac{33\ln 2}{20}}$

$y = 156916.82$