MTH 174, Quiz #1, Spring 2018 Name KEY

Instructions: Show all work. Use exact answers unless otherwise asked to round.

1. Integrate.

a. $\int \sqrt{\tan x}\sec^2 x\,dx$

$u = \tan x$

$du = \sec^2 x$

$\int u^{1/2}\,du = \frac{2}{3}u^{3/2} + C = \boxed{\frac{2}{3}(\tan x)^{3/2} + C}$

b. $\int \frac{x^2-1}{\sqrt{2x-1}}dx$

$u = \sqrt{2x-1}$

$u^2 = 2x-1$

$\frac{u^2+1}{2} = x$

$u\,du = dx$

$x^2 = \frac{1}{4}(u^4+2u^2+1)$

$x^2 - 1 = \frac{1}{4}u^4 + \frac{2u^2}{2} + \frac{1}{4} - 1$

$= \frac{1}{4}u^4 + \frac{1}{2}u^2 - \frac{3}{4}$

$\int \frac{\frac{1}{4}u^4 + \frac{1}{2}u^2 - \frac{3}{4}}{u} \cdot u\,du$

$= \frac{1}{20}u^5 + \frac{1}{6}u^3 - \frac{3}{4}u + C$

$= \boxed{\frac{1}{20}(2x-1)^{5/2} + \frac{1}{6}(2x-1)^{3/2} - \frac{3}{4}(2x-1)^{1/2} + C}$

2. Use Simpson's Rule to approximate $\int_0^1 \sin x^2\,dx$ with $n = 4$. Report your answer to 4 decimal places.

$\Delta x = \frac{1-0}{4} = \frac{1}{4}$

$\frac{1}{12}\left[\sin^2 0 + 4\sin^2\frac{1}{4} + 2\sin^2\frac{1}{2} + 4\sin^2\frac{3}{4} + \sin^2 1\right] = .27259\ldots$

$\boxed{.2726}$