Note: In this version of the test, there are references to problems from the text. These are similar to the test problem and are good for further self study. ALL of these problems were assigned homework problems in the term the test was given. The text for the course in this term was *CALCULUS*, by Hughes-Hallet, Gleason, McCallum, et. al., Third Edition.

1. (14 points) **(a)** (See the odd exercises in Chapter 6, Section 2.) An antiderivative of

$$f(t) = \sin(t) + \frac{1}{\cos^2 t}$$

is $F(t) = \underline{-\cos t + \tan t}$.

(b) If $\int_0^3 f(x)\,dx = 3$, then $\int_0^3 (f(x) + 2)\,dx = \int_0^3 f(x)\,dx + \int_0^3 2\,dx = 3 + 2 \cdot 3 = 9$.

(c) A cubic polynomial (3rd degree polynomial) always has a

(i) local maximum	**Yes**	**<u>No</u>**
(ii) local minimum	**Yes**	**<u>No</u>**
(iii) global maximum	**Yes**	**<u>No</u>**
(iv) global minimum	**Yes**	**<u>No</u>**
(v) inflection point	**<u>Yes</u>**	**No**

(d) (See problem 79, Chapter 6, Section 2.) The exact value of c such that

$$\int_0^c x\sqrt{x}\,dx = \frac{4}{5}.$$

is $c = 2^{\frac{2}{5}} = 4^{\frac{1}{5}}$

Calculation:

$$\frac{4}{5} = \int_0^c x\sqrt{x}\,dx = \int_0^c x^{\frac{3}{2}}\,dx = \frac{2}{5}x^{\frac{5}{2}}\Big|_0^c = \frac{2}{5}\left(c^{\frac{5}{2}} - 0\right) = \frac{2}{5}c^{\frac{5}{2}} \quad \textbf{or} \quad \frac{4}{5} = \frac{2}{5}c^{\frac{5}{2}}.$$

Therefore, $c^{\frac{5}{2}} = 2$ **or** $c = 2^{\frac{2}{5}}$.