Test-2 Version A

No work = No credit!

1. Evaluate the following integrals.

   a) $\int \sin(x)\cos^2(x)dx$ **b)** $\int \tan^2(x)\sec^2(x)dx$

2. Evaluate $\int \frac{1}{x^2\sqrt{x^2+9}}dx$.

3. Evaluate $\int \frac{x^5+x+1}{x^4+x^2}dx$.

4. Use
$$\int u^n arctan(u)dx = \frac{1}{n+1}\left[u^{n+1}arctan(u) - \int \frac{u^{n+1}}{1+u^2}du\right]$$
   to evaluate $\int 5e^{10x}arctan(e^{5x})dx$

5. **a)** Use Trapezoidal Rule and Simpson's Rule to estimate $\int_0^{\pi} \sin(x)dx$ with $n = 4$. (12pt)
$$\left[\sin(0) = 0,\ \sin\left(\frac{\pi}{4}\right) = \frac{\sqrt{2}}{2},\ \sin\left(\frac{\pi}{2}\right) = 1,\ \sin\left(\frac{3\pi}{4}\right) = \frac{\sqrt{2}}{2},\ \sin(\pi) = 0\right]$$
   b) Estimate the errors in the approximations in **5a)**. (4pt)

   c) Find the Exact value of $\int_0^{\pi} \sin(x)dx$. (4pt)

6. Evaluate the following integrals.

   a) $\int_1^{+\infty} \frac{1}{x^2(x^2+1)}dx$ **(Hint: Partial fraction;** $arctan(1) = \frac{\pi}{4}$**;** $\lim_{t\to\infty} arctan(t) = \frac{\pi}{2}$**)**

   b) $\int_0^3 \frac{1}{(x-2)^2}dx$

Test-1 Version B

No work = No credit!

1. Evaluate the following integrals.

   a) $\int \sin(x)^2 \cos(x) dx$ **b)** $\int \tan(x) \sec^3(x) dx$

2. Evaluate $\int \frac{1}{x^2\sqrt{x^2+4}} dx$.

3. Evaluate $\int \frac{x^5+2x^2+x+1}{x^4+x^2} dx$.

4. Use

$$\int u^n arcsin(u) dx = \frac{1}{n+1}\left[u^{n+1} arctan(u) - \int \frac{u^{n+1}}{1+u^2} du\right]$$

   to evaluate $\int 4e^{8x} arctan(e^{4x}) dx$

5. **a)** Use Trapezoidal Rule and Simpson's Rule to estimate $\int_{-\pi/2}^{\pi/2} \cos(x) dx$ with $n = 4$. (12pt)

$$\left[\cos\left(-\frac{\pi}{2}\right) = 0,\ \cos\left(-\frac{\pi}{4}\right) = \frac{\sqrt{2}}{2},\ \cos(0) = 1,\ \cos\left(\frac{\pi}{4}\right) = \frac{\sqrt{2}}{2},\ \cos\left(\frac{\pi}{2}\right) = 0\right]$$

   b) Estimate the errors in the approximations in **5a)**. (4pt)

   c) Find the Exact value of $\int_{-\pi/2}^{\pi/2} \cos(x) dx$. (4pt)

6. Evaluate the following integrals.

   a) $\int_{-\infty}^{-1} \frac{1}{x^2(x^2+1)} dx$ **(Hint: Partial fraction;** $arctan(-1) = -\frac{\pi}{4}$**;** $\lim_{t\to-\infty} arctan(t) = -\frac{\pi}{2}$**)**

   b) $\int_0^3 \frac{1}{(x-1)^2} dx$