

Credit is given only if you choose the correct answer *and* show supporting work.

1. Evaluate the following integral

$$\int_2^3 \frac{1}{(x^2 - 4x + 5)^2} dx.$$

- A.) $\frac{1}{2}\pi + \frac{1}{2}$ B.) $\frac{1}{2}\pi + \frac{1}{4}$ C.) $\frac{1}{4}\pi + \frac{1}{4}$ D.) $\frac{1}{4}\pi + \frac{1}{8}$ E.) $\frac{1}{8}\pi + \frac{1}{4}$ F.) $\frac{1}{8}\pi + \frac{1}{8}$

2. Evaluate the following integral

$$\int_2^3 \frac{x^3 + 1}{x^3 - x^2} dx.$$

- A.) $\frac{5}{6} + \ln \frac{8}{3}$ B.) $\frac{4}{5} + \ln \frac{7}{3}$ C.) $\frac{5}{7} + \ln \frac{7}{4}$ D.) $\frac{6}{7} + \ln \frac{8}{5}$ E.) $\frac{2}{3} + \ln \frac{11}{12}$ F.) $\frac{3}{2} + \ln \frac{3}{4}$

3. Evaluate the following improper integral,

$$\int_1^{\infty} \frac{\tan^{-1} x}{x^2} dx.$$

- A.) $4\pi - \ln 8$ B.) $2\pi - \ln 8$ C.) $\pi + \ln 4$ D.) $\frac{1}{2}\pi + \ln 2$ E.) $\frac{1}{4}\pi + \frac{1}{2} \ln 2$
F.) The integral diverges

4. We know that

$$\int_0^1 \frac{1}{x^2 + 1} dx = \tan^{-1} 1 = \frac{\pi}{4}.$$

Use *Simpson's Rule* with $n = 4$ to find an approximate value for the integral (i.e., compute S_4), and then multiply S_4 by 4 to get an approximate value for π . Use a calculator.

If you know that the first eight digits of π are 3.1415926..., then how many of these digits are correct in your approximation? (Example: if you found that $4S_4 = 3.1427\dots$, then you would have 3 correct digits of π .)

A.) 3 B.) 4 C.) 5 D.) 6 E.) 7 F.) 8