Printed Name _____ Signature _____

Calculus II Quiz #4

Show your work and clearly label your answers on this quiz. *No scrap paper, calculators, or notes are allowed* (or needed). This quiz is scored out of 50 points. (There are 60 points possible.) You have 30 minutes to complete the quiz.

To get credit on a problem, you *must* show work. Even if you can do the work in your head, the point of these exercises is to get you to articulate your thought processes.

Problem 1 (10 pts)

$$\int \frac{x+25}{x^2+24x+148}dx =$$

Problem 2 (10+5 pts)

Use the Trapezoidal Rule, with $n = 6$, to approximate $\int_0^3 (x^2 + 4)dx$, and compare to the exact answer of the integral.

(Hint: 1/2 on the outside, and 1, 2, 2, ..., 2, 1 on the inside.)

Problem 3 (5+5+5 pts)

(a) $\lim_{x\to 5} \frac{e^{5-x}}{(x-5)^2} =$

(b) $\lim_{x\to 0} \frac{\sqrt{25-x^2}-5}{x^2} =$

(c) $\lim_{x\to \frac{\pi}{2}} \frac{\cos(5x)}{\cos(3x)} =$

Problem 4 (10+10 pts)

(a) Find the area of the region bounded by $x = 0$, $y = 0$, and $y = x^2 e^{-x}$; that is, compute

$$\int_0^\infty x^2 e^{-x} dx =$$

(b) Compute the volume of the solid formed by revolving the curve $y = e^{-x}$, starting at $x = 0$ and going right (limit as $x \to \infty$) around the x-axis.

(Conclusion: there are some abstract shapes that have infinite length and finite area, and abstract solids that have infinite surface area but contain finite volume.
This phenomenon is referred to as *Gabriel's horn* or *Torricelli's trumpet*.)