Math 1AA3 Practice Test #1
(more challenging than the real test!)

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1. Only the Casio FX-991 calculator is permitted.

2. The following formulas may prove to be useful:

   - Area of surface of revolution (revolving the curve $y = f(x), a \leq x \leq b$ about x-axis):

   $$S = \int_a^b 2\pi f(x)\sqrt{1 + (f'(x))^2}dx$$

   - Hydrostatic pressure at depth h in fluid of density ρ: $P = \rho gd$.
   - Work in moving with a force $F(x)$ from $x = a$ to $x = b$: $W = \int_a^b F(x)dx$.

1. Stewart Exercise 6.4.30.

2. Use the comparison theorem to determine whether the integral is divergent or convergent. If convergent, compute its value:

$$\int_1^\infty \frac{x+1}{\sqrt{x^4 - x}}dx$$

3. Stewart Exercise 8.2.11.

4. Stewart Exercise 8.3.5.

5. Stewart Exercise 9.3.31 (leave out the sketching part).

6. Stewart Exercise 9.3.43.

7. Stewart Exercise 9.5.19.

8. Find the centroid of the "lune" shape in the (x, y) plane bounded above by the function $y = f(x) = \sqrt{1 - x^2}$ and below by the function $y = g(x) = -\frac{3}{4} + \sqrt{\frac{25}{16} - x^2}$, for the range $-1 \leq x \leq 1$.

END OF TEST