

Name:

Math 115 Exam 4

1. WRITE YOUR NAME ON THIS TEST!
2. Except where indicated, merely finding the answer to a problem is not enough to receive full credit; you must show how you arrived at that answer.
3. Unless indicated, DO NOT convert irrational numbers such as $\sqrt{3}$ or π into decimal approximations; just leave them as they are.
4. If you have a question, raise your hand or come up and ask me.

1) (15 points) Let $f(x) = \frac{1}{x^2} - \frac{1}{x^4}$. Determine all inflection points and intervals of concavity for f .

2) Compute the following integrals:

a) (6 points) $\int x^{7/2} - 4 \sin(x) dx$

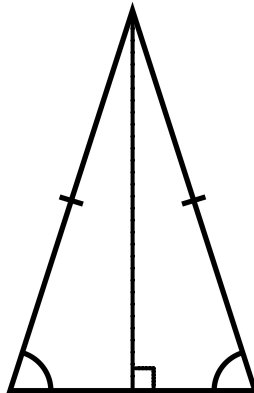
b) (8 points) $\int_{-8}^8 \sqrt{64 - x^2} dx$

3) Let $p(x) = 7x^9 + 5x^3 + 6x + 11$

a) (5 points) Using the Intermediate Value Theorem, show that there is a real number c with $p(c) = 0$.

b) (8 points) Show that there cannot be more than one real number c with $p(c) = 0$.

4) You have an isosceles triangle in front of you. Label the base as b and the other sides as x .



Suppose the perimeter of the triangle is fixed at 60mm.

- a) (4 points) Find a formula for h in terms of b and x .
- b) (5 points) Find a one-variable formula for the area of the triangle.
- c) (9 points) Find the maximum possible area of the triangle. (*Hint:* maximize the square of the area instead.)

BONUS: (10 points) Compute

$$\lim_{n \rightarrow \infty} \left(\frac{8}{n} \sum_{i=1}^n \sqrt{64 - \frac{64i^2}{n^2}} \right)$$

The limit exists, so don't waste your time telling me that it doesn't