Math 140  Exam 2  Review lecture  100

Exam 2. Lectures 7-12. No calculators. Understanding is not enough; you must be proficient enough to complete the exam in 50 minutes. Use only the provided scratch paper.

Know the area and volume formulas for triangles, rectangles, circles, boxes, cans (including curved surface area).

1(12). (a) \( f^{-1}(x) = \sqrt[3]{\frac{x}{x+1}} \), find \( f(x) \).

... \( f(x) = \frac{x^3}{1-x^3} \)

(b) \( f(x) = x^2 + 4x \) for \( x \leq -2 \), find \( f^{-1}(x) \).

... \( f^{-1}(x) = -2 - \sqrt{4+x} \)

2(4). The curve on the left is the graph of \( f(x) \). Graph \( f^{-1}(x) \) if it exists. If not, write “not 1-1”. Answer on right.

3(10). Graph and on the graph mark the vertex and give both coordinates. Also mark the intercepts.

\( y = 2x^2 + 4x \)

... 3.

In 4 and 5,

Picture: Draw the picture. On the picture indicate your variables.

Given: Write the equations which relate the variables.

Answer: Solve for the wanted quantities.

4(12). A circle is inscribed inside a square. Express the area \( A \) of the circle as a function of the width \( x \) of the square.

... Picture:

Given: \( A = \pi r^2 \) \( r + r = x \)

Answer: \( A = \frac{\pi x^2}{4} \) ft.

5(12). A man stands 6 feet away from a 10' high lamp. Express the length \( s \) of his shadow as a function of his height \( h \).

... Picture:

Given: \( \frac{10}{6+s} = \frac{h}{s} \)

Answer: \( s = \frac{6h}{10-h} \)

6(22). Graph. Mark the intercepts and the asymptotes.

(a) \( y = \frac{x^2}{1-x^2} \).

(b) \( y = \frac{1-x^2}{x^2} \).

6a. ... 6b.

7(2). Estimate as a power of 10. \( 250 \approx 10^{15} \)

8(4). Solve for \( t \): \( \sqrt{3} (2t-3) = 9 \)

... \( t = 7/2 \)

9(4). Simplify to a rational number.

(a) \( \log \sqrt{x} (1/2) \)

(b) \( \ln(1/\sqrt{e}) \)

... (a) \(-2\) ... (b) \(-1/2\)

10(8). Graph. Mark the intercepts and asymptotes and list the domain and range. \( y = 2 - \ln(3-x) \)

... Hor. asymp.: none. Vert. asymp.: \( x = 3 \). Root \( x = 2 \)

11(10). Find the exact answer. No decimals.

(a) Solve for \( w \): \( (6^{2w})^4 = 5 \) Use an appropriate logarithm.

... \( w = \frac{\log_6(5)}{8} \)

(b) Solve using natural logarithms: \( 2^x = 3^{x-6} \). Write your answer as a ratio of two natural logarithms.

... \( x = \frac{6 \ln(3)}{\ln(3/2)} = \ln(3^6)/\ln(3/2) \)

Know volume, area, and circumference formulas (inside the front cover of the text).