Spring '04/MAT 140/Exam 1 **Name:** *Show all your work.*

1. (4pts) Identify each of the following numbers as integer, rational or irrational.

$$-3 \qquad \sqrt{2} \qquad 3.264138465\ldots \text{(no repetition of digits)} \qquad \frac{7}{6}$$

2. (2pts) Sketch the numbers 4 and $-\frac{7}{4}$ on the real number line and find the distance between them.

3. (2pts) Convert to or from scientific notation:

$7.655 \times 10^{-4} =$

$631,764,231 =$

4. (3pts) Use your calculator to evaluate the expression below. Round to six significant digits or 3 decimal places, whichever is more. Copy on paper how you entered the expression in your calculator.

$$\frac{7.3 + \sqrt{3.5 \cdot 2.7}}{-3 \cdot 1.75} =$$

5. (6pts) Use formulas to expand:

a) $(3x-5)^2 =$

b) $(x-5)^3 =$

6. (6pts) Factor the following:

a) $12x^2 - 5x - 2 =$

b) $8x^3 + 27 =$

7. (4pts) Divide $x^3 - 3x^2 + 4x + 5$ by $x^2 + 2$ and use the results to write $\dfrac{2x^2 - 7x + 5}{2x + 1}$ in form quotient $+ \dfrac{\text{remainder}}{\text{divisor}}$.

8. (4pts) Find the area of the shape in the picture if the radius of the semicircular region is 3in.

9. (5pts) Simplify and write without negative exponents.

a) $\dfrac{x^2(y^3z^{-1})^4}{(x^4y)^3z^3} =$

b) $\dfrac{\left(\dfrac{x}{y}\right)^{-2}\left(\dfrac{y}{x}\right)^4}{x^2y^3} =$

10. (3pts) Rationalize the denominator:

a) $\dfrac{11}{\sqrt{6}} =$

b) $\dfrac{5}{4-\sqrt{2}} =$

11. (4pts) Simplify (assume x is positive):

a) $\sqrt{18x^5} =$

b) $\sqrt{5x}\sqrt{20x^3} =$

12. (7pts) Simplify.

a) $\dfrac{2x}{x^2-3x-10}+\dfrac{3}{x^2-25}=$

b) $\dfrac{\dfrac{10}{x+3}-4}{1+\dfrac{x}{x+1}}=$

Bonus (5pts) How far can you see from a tower 300 feet tall? The radius of Earth is 3960 miles and 1 mile = 5280 feet. Draw a picture.