

Homework 1 - Math 141, Frank Thorne (thornef@mailbox.sc.edu)

Due Monday, August 31.

Important: As with everything else in life, being right is not enough. Please show your work, write in complete sentences, and explain your reasoning clearly.

Required problems.

- (a) Thomas, Ch. 1.1, 7, 10, 25.
- (b) What is a function? (This is the most important question in all of mathematics.)
- (c) Thomas, Ch. 1.2, 6, 23, 55.
- (d) Simplify $\frac{1}{x+1} - \frac{1}{x}$.
- (e) Simplify $(abc)^{10}(a^5b^3d^{-2})^{-2}$.
- (f) Simplify $\frac{\frac{1}{x+h} - \frac{1}{x}}{h}$.
- (g) Simplify $\frac{(x+h)^2 - x^2}{h}$.
- (h) Simplify $\frac{(xy^2)^2}{(x^2y)^2}$.
- (i) Simplify $(x+2)(x+3) + (x+2)(x-3)$.
- (j) Simplify $(x+1)^2(x+2)^3 + (x+1)^3(x+2)^2$.
- (k) Factor $x^2 - a^2$.
- (l) Factor $x^3 - a^3$.
- (m) Factor $x^3 + a^3$.
- (n) Define the trigonometric functions $\sin(x)$, $\cos(x)$, $\tan(x)$, $\sec(x)$, $\csc(x)$, and $\cot(x)$.
- (o) Draw the unit circle and indicate the following angles on it: 0 , $\pi/6$, $\pi/4$, $\pi/3$, $\pi/2$, $2\pi/3$, $3\pi/4$, $5\pi/6$, π , $7\pi/6$, $5\pi/4$, $4\pi/3$, $3\pi/2$, $5\pi/3$, $7\pi/4$, $11\pi/6$. For each angle, compute $\sin(x)$, $\cos(x)$, $\tan(x)$, $\cot(x)$, $\csc(x)$, and $\sec(x)$.
- (p) Define the exponential and logarithmic functions e^x and $\ln x$.
- (q) Thomas, Ch. 1.5, 3, 7, 11-12.
- (r) Define the term *inverse function*. Give an example of a function that has an inverse, and of a function that does not.
- (s) Thomas, Ch. 1.6, 19, 20, 25, 26.

Additional problems.

- (a) Ch. 1.1, 15-18, 26-28; Ch. 1.2, 5, 24, 56; Ch. 1.5, 5, 24, 35-44; Ch. 1.6, 21, 22, 27, 28.