

Functions, Exponentials, Trigonometry

1. Use the laws of exponents to simplify completely.

$$(a) \frac{x^{2n} \cdot x^{3n-1}}{x^{n+2}} \qquad (b) \frac{\sqrt{a}\sqrt{b}}{\sqrt[3]{ab}}$$

2. Sketch the graph without a calculator. Make sure you label key attributes of the function. If the asymptote is NOT the x- or y-axis, you should have a dotted line for the asymptote.

$$(a) y = 10^x \qquad (b) y = 1 - e^{-x}$$
$$(c) y = 1 - 2 \cos x \qquad (d) y = \frac{x + 1}{x^2 - 2x - 3}$$

3. Find the domain.

$$(a) f(x) = \frac{1 - e^{x^2}}{1 - e^{1-x^2}} \qquad (b) g(x) = \frac{1 + x}{e^{\cos x}}$$
$$(c) h(x) = \sqrt{1 - 2^x}$$

4. For the following functions, find $f \circ g$ and $g \circ f$ and find maximal domains for the new functions.

$$(a) f(x) = \sqrt{x}; g(x) = \sqrt[3]{1-x} \qquad (b) f(x) = x + \frac{1}{x}; g(x) = \frac{x+1}{x+2}$$
$$(c) f(x) = \frac{x}{1-x}; g(x) = \sin 2x$$

5. Find the exact value for the following expressions.

$$(a) \log_3 \left(\frac{1}{27} \right) \qquad (b) \log_2(6) - \log_2(15) + \log_2(20)$$
$$(c) e^{-2 \ln 5}$$

6. Solve for x . Do not round to decimals, but give answers in simplest form.

$$(a) e^{2x} - 3e^x + 2 = 0 \qquad (b) \ln x + \ln(x + 1) = 1$$
$$(c) \ln(\ln x) = 1$$

7. If $\sin \theta = \frac{11}{61}$ and $\cos \theta > 0$, find the values of the five remaining trigonometric functions.

8. Find the exact value of $\cos(\arctan(2))$ without using a calculator.

9. Evaluate the following expressions:

(a) $\arccos\left(\frac{\sqrt{3}}{2}\right)$

(b) $\arcsin\left(\frac{-1}{2}\right)$

(c) $\arctan(-1)$