Last Name:_____ First Name:_____

1.) False

2.) True

3.) True

4.) False

5.) True

6.) False

7.) $\frac{1}{9}$

8.) 8

9.) 10,000

10.) $\frac{9}{4}$

11.) 5

12.) $-\frac{3}{11}$

13.) 3

14.) $\log_e(7)$

15.) $\frac{1}{8}$

16.) $\log_e(7)-5$

17.) $\frac{e^2}{2}$

18.) $\frac{\log_e(11)-4}{3}$

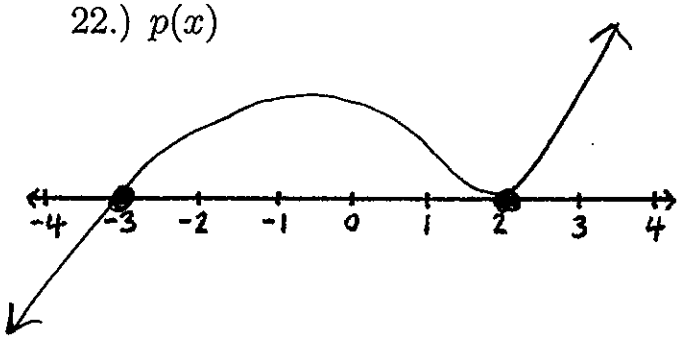
19.) $\frac{8}{e^3-1}$

20.) 1

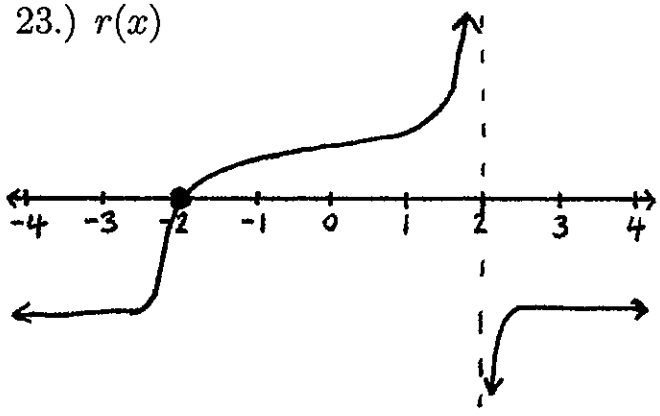
21.) $(x-1)\left(x-\frac{-3+\sqrt{5}}{2}\right)\left(x+\frac{3+\sqrt{5}}{2}\right)$

****

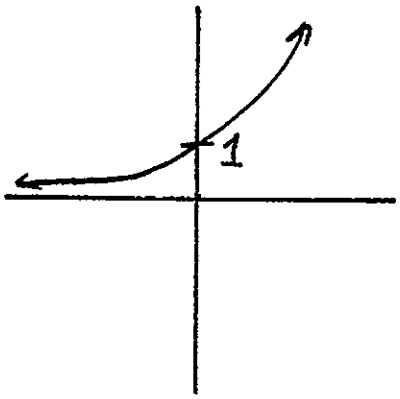
22.) $p(x)$



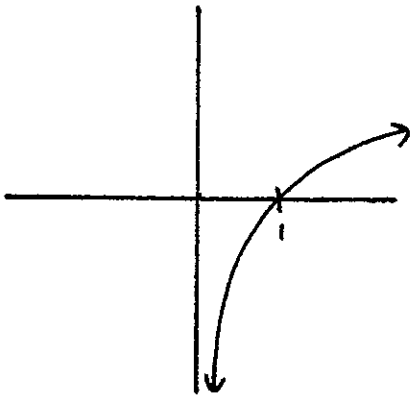
23.) $r(x)$



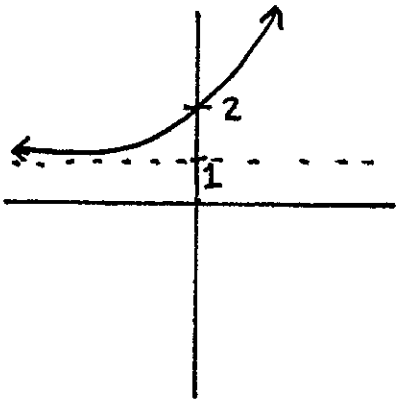
24.) e^x



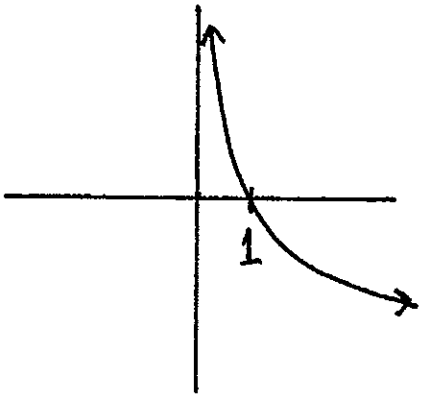
25.) $\log_e(x)$



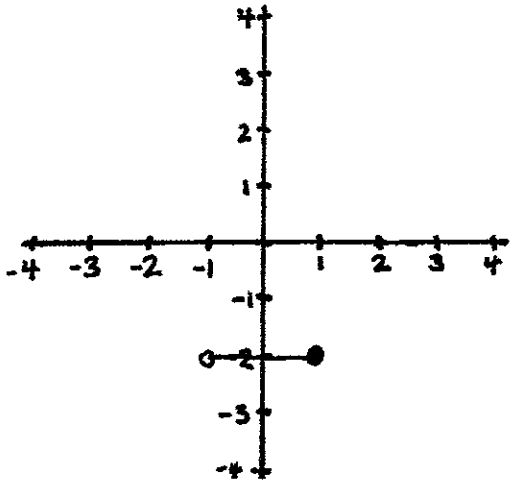
26.) $e^x + 1$



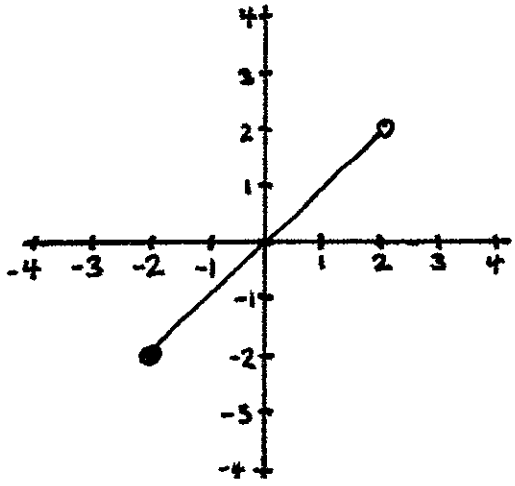
27.) $-\log_e(x)$



28.) $f(x)$



29.) $g(x)$



Third Exam

For #1-6 write the entire word "True" or the entire word "False".

1.) $\log_a(\frac{z}{w}) = \log_a(z) + \log_a(w)$

2.) $\log_a(\frac{z}{w}) = \log_a(z) - \log_a(w)$

3.) $\log_a(z^w) = w \log_a(z)$

4.) $\frac{a^x}{a^y} = a^{x+y}$

5.) $(a^x)^y = a^{xy}$

6.) $a^x a^y = a^{xy}$

****

7.) Write $3^{173}3^{-176}3$ as a rational number in standard form.

$3^{173-176+1} = 3^{-2} = \frac{1}{3^2} = \frac{1}{9}$

8.) Write $(4^{\frac{3}{5}})^{\frac{5}{2}}$ as a rational number in standard form.

$4^{\frac{3}{5}\cdot\frac{5}{2}} = 4^{3/2} = 2^3 = 8$

9.) Write $1,000^{\frac{4}{3}}$ as a rational number in standard form.

$(10^3)^{4/3} = 10^4 = 10{,}000$

10.) Write $(\frac{8}{27})^{-\frac{2}{3}}$ as a rational number in standard form.

$\left(\frac{27}{8}\right)^{2/3} = \left(\frac{3}{2}\right)^2 = \frac{9}{4}$

11.) Write $\log_{10}(100,000)$ as a rational number in standard form.

$\log_{10}(10^5) = 5$

12.) Write $\log_3(\frac{1}{\sqrt[11]{27}})$ as a rational number in standard form.

$\log_3\left(3^{-3/11}\right) = -3/11$

13.) What is the greatest integer that is less than $\log_2(13)$?

$2^3 < 13 < 2^4$

so $3 < \log_2(13) < 4$

14.) Solve for x if $e^x = 7$

$x = \log_e(7)$

15.) Solve for x if $\log_4(x) = -\frac{3}{2}$
(Write your answer as a rational number in standard form.)

$x = 4^{-3/2} = 2^{-3} = \frac{1}{2^3} = \frac{1}{8}$

16.) Solve for x if $2 + e^{x+5} = 9$

$e^{x+5} = 7$

$x + 5 = \log_e(7)$

$x = \log_e(7) - 5$

17.) Solve for x if $4\log_e(2x) = 8$

$$\log_e(2x) = \frac{8}{4} = 2$$

$$2x = e^2$$

$$x = e^2/2$$

18.) Solve for x if $e^{2x+1}e^{x+3} = 11$

$$e^{(2x+1)+(x+3)} = 11$$

$$e^{3x+4} = 11$$

$$3x+4 = \log_e(11)$$

$$3x = \log_e(11) - 4$$

$$x = \frac{\log_e(11) - 4}{3}$$

19.) Solve for x if $\log_e(x+8) = 3 + \log_e(x)$

$$\log_e(x+8) - \log_e(x) = 3$$

$$\log_e\left(\frac{x+8}{x}\right) = 3$$

$$\frac{x+8}{x} = e^3$$

$$x+8 = xe^3$$

$$8 = xe^3 - x = x(e^3-1)$$

$$\frac{8}{e^3-1} = x$$

20.) Find a root of $x^3 + x - 2$

Factors of -2 : $1, -1, 2, -2$

$1^3 + 1 - 2 = 0$ so 1 is a root

21.) (2 pts.) Completely factor $x^3 + 2x^2 - 2x - 1$ (Hint: 1 is a root.)

1	1	2	−2	−1
		1	3	1
	1	3	1	0

$x^3 + 2x^2 - 2x - 1$

$(x-1)$ (x^2+3x+1)

$\left(x - \frac{-3+\sqrt{5}}{2}\right)$ $\left(x + \frac{3+\sqrt{5}}{2}\right)$

Discriminant of x^2+3x+1 is

$3^2 - 4(1)(1) = 9 - 4 = 5$

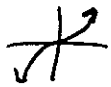
so there are two roots:

$\frac{-3+\sqrt{5}}{2}$ and $\frac{-3-\sqrt{5}}{2}$

22.) Graph $p(x) = 4(x+3)(x-2)(x-2)(x^2+3)$

x-int: $-3, 2$

between -3 and 2: $p(0) = 4(3)(-2)(-2)(3) > 0$

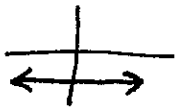
left and right: $4x^5$ 

23.) Graph

vert. asym: 2

x-int: -2

in between: $r(1) = \frac{-3(3)}{4(-1)} > 0$ $r(x) = \frac{-3(x+2)}{4(x-2)}$

right and left: $\frac{-3x}{4x} = -\frac{3}{4}$ 

24.) Graph e^x and label its y-intercept.

25.) Graph $\log_e(x)$ and label its x-intercept.

26.) Graph $e^x + 1$ and label its x- and y-intercepts (if there are any).

27.) Graph $-\log_e(x)$ and label its x- and y-intercepts (if there are any).

28.) Graph $f : (-1, 1] \to \mathbb{R}$ where $f(x) = -2$.

29.) Graph $g : [-2, 2) \to \mathbb{R}$ where $g(x) = x$.