

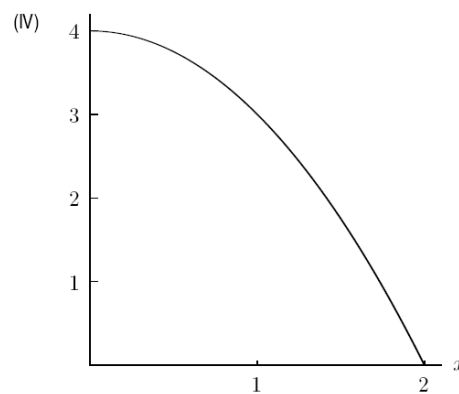
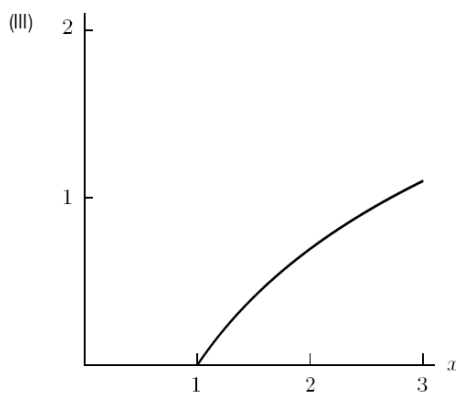
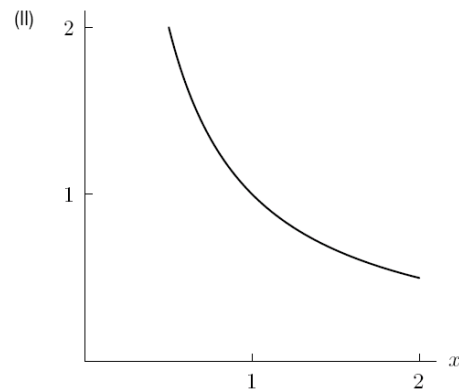
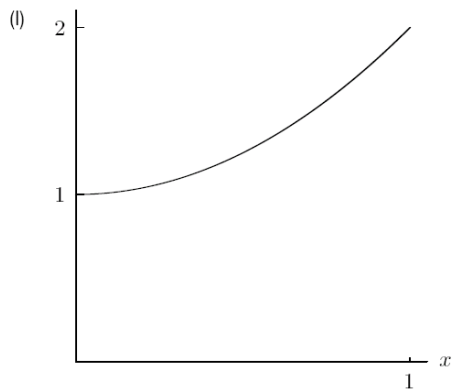
# Classroom Voting Questions: Precalculus

## Exponential Functions

1. The graph of a function is either concave up or concave down.

- (a) True, and I am very confident
- (b) True, but I am not very confident
- (c) False, but I am not very confident
- (d) False, and I am very confident

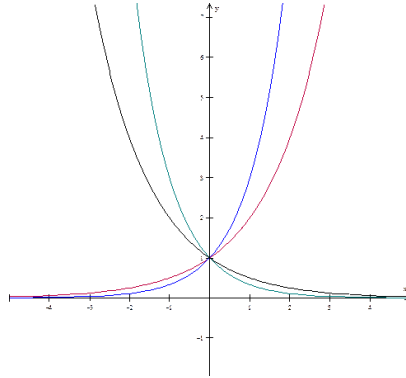
2. Which graph shows a function that is decreasing and concave up? Which graph shows a function that is increasing and concave down?



- (a) I, II
- (b) IV, I
- (c) II, I
- (d) II, III

(e) IV, III

3. Which exponential function has the largest base?



- (a) red
- (b) blue
- (c) green
- (d) black

4. Every exponential function has a vertical intercept.

- (a) True, and I am very confident
- (b) True, but I am not very confident
- (c) False, but I am not very confident
- (d) False, and I am very confident

5. Every exponential function has a horizontal intercept.

- (a) True, and I am very confident
- (b) True, but I am not very confident
- (c) False, but I am not very confident
- (d) False, and I am very confident

6. An exponential function of the form  $f(x) = k \cdot a^x$  will always pass through the point  $(0, 1)$ .

- (a) True, and I am very confident.

- (b) True, but I am not very confident.
- (c) False, but I am not very confident.
- (d) False, and I am very confident.

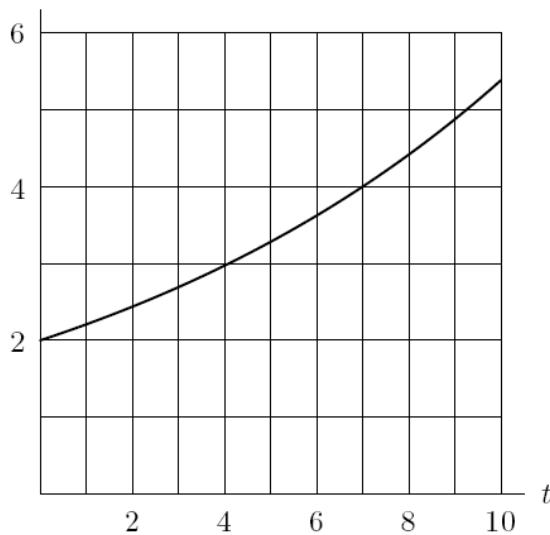
7. If \$5,000 is invested at 4 % annual interest, compounded continuously, the value of the investment after  $t$  years is  $V(t) = 5000e^{.04t}$ . What is the value after  $t = 15$  years?

- (a) \$5204.05
- (b) \$9110.59
- (c) \$13591.41
- (d) \$78060.81

8. Let  $f(x) = ab^x$ , with  $b > 0$ . Then  $\frac{f(x+h)}{f(x)} =$

- (a)  $b^h$
- (b)  $h$
- (c)  $b^{x+h} - b^x$
- (d)  $a$

9. Estimate the doubling time for the exponential growth shown in the figure below.



- (a) 4
- (b) 5
- (c) 7

(d) 10

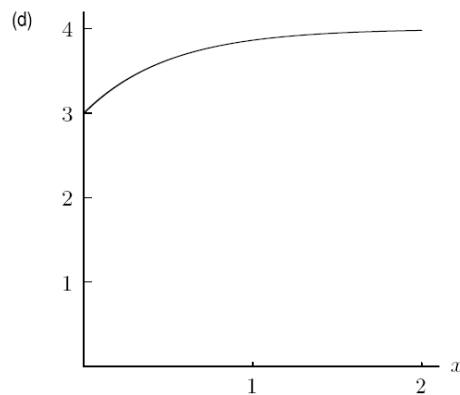
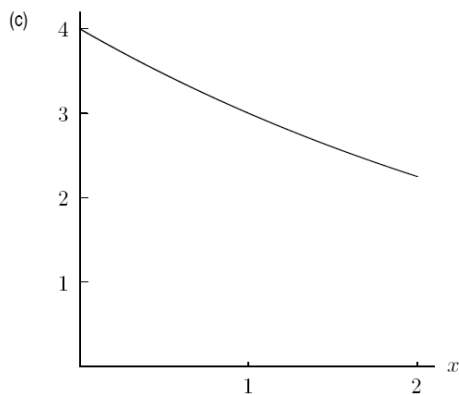
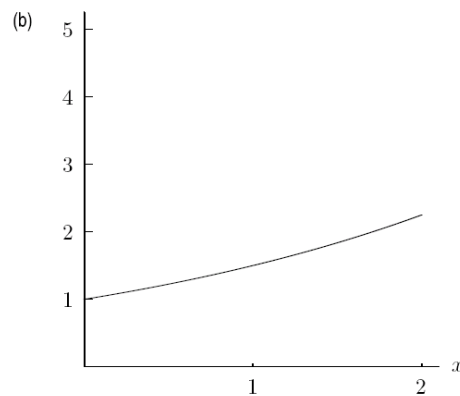
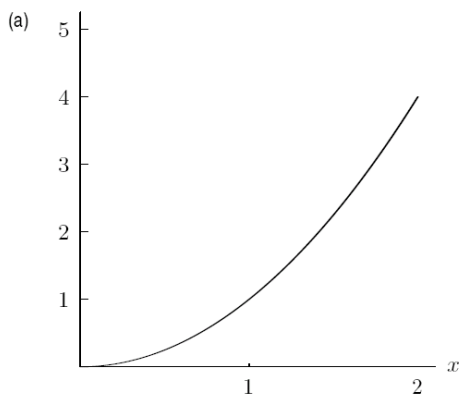
10. The exponential function  $y = 3 \cdot (\frac{1}{2})^x$  could be an appropriate model for exponential growth.

- (a) True, and I am very confident.
- (b) True, but I am not very confident.
- (c) False, but I am not very confident.
- (d) False, and I am very confident.

11. Find the equation for an exponential function that passes through the points (1,2) and (3,18).

- (a)  $f(t) = 2 \cdot 9^t$
- (b)  $f(t) = (\frac{2}{9}) 9^t$
- (c)  $f(t) = (\frac{2}{3}) 3^t$
- (d)  $f(t) = 2 \cdot 3^t$

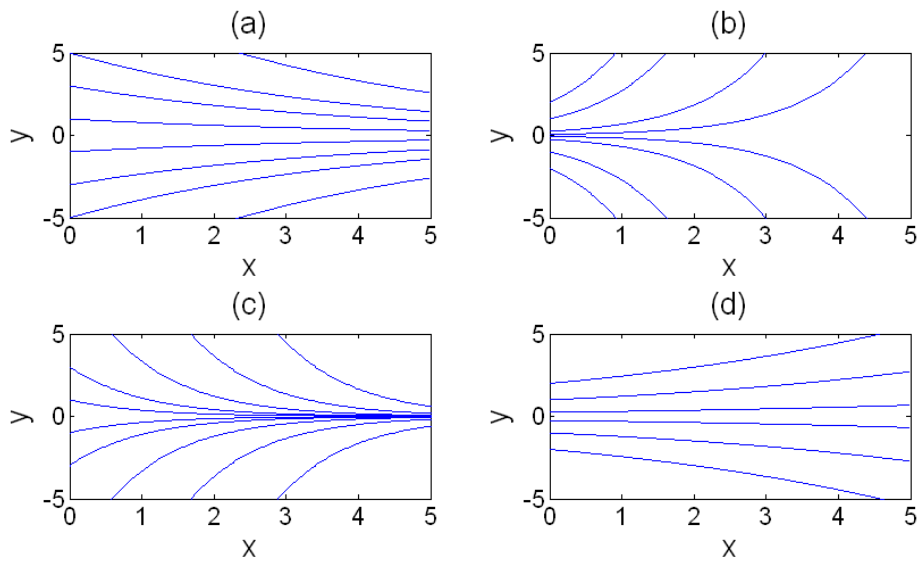
12. Which of the following graphics could be that of  $y = ab^x$  if  $b > 1$ ?



13. "During 1988, Nicaragua's inflation rate averaged 1.3% a day." Which formula represents the above statement? Assume  $t$  is measured in days.

- (a)  $I = I_0 e^{0.013t}$
- (b)  $I = I_0(1.013)^t$
- (c)  $I = I_0(1.013)t$
- (d)  $I = I_0(1.3)^t$

14. Graph (a) shows several functions of the form  $y(x) = Q_0 e^{k_a x}$  with several different values of  $Q_0$  but the same value of  $k_a$ . Graph (b) shows several functions of the form  $y(x) = Q_0 e^{k_b x}$  with several different values of  $Q_0$  but the same value of  $k_b$ , and similarly for graphs (c) and (d). Rank the constants  $k_a, k_b, k_c$  and  $k_d$  from smallest to largest.



- (a)  $k_b < k_d < k_a < k_c$
- (b)  $k_d < k_c < k_b < k_a$
- (c)  $k_c < k_a < k_d < k_b$
- (d)  $k_a < k_b < k_c < k_d$

15. Which of the following is an exponential function which has a  $y$  intercept of 4 and goes through the point (2,9)?

- (a)  $f(x) = 4 \cdot 1.25^x$
- (b)  $f(x) = 4 \cdot 1.5^x$
- (c)  $f(x) = 4 \cdot 2.25^x$
- (d)  $f(x) = 2 \cdot 1.25^x$

(e)  $f(x) = 2 \cdot (\sqrt{9/2})^x$

(f)  $f(x) = 2 \cdot 1.5^x$

16. Which of the following is an exponential function which goes through the points (2,3) and (3,1)?

(a)  $f(x) = \frac{3}{4} \cdot 2^x$

(b)  $f(x) = 12 \cdot \frac{1}{2}^x$

(c)  $f(x) = 12 \cdot \frac{1}{4}^x$

(d)  $f(x) = 27 \cdot \frac{1}{3}^x$

17. The following table shows the net sales at Amazon.com from 2003 to 2010 (*source: Amazon.com quarterly reports*):

Year	2003	2004	2005	2006	2007	2008	2009	2010
Billions of dollars	\$5.26	\$6.92	\$8.49	\$10.72	\$14.84	\$19.15	\$24.51	\$34.21

What would be the most appropriate type of function to model this data?

- (a) linear  
(b) exponential  
(c) power  
(d) It is impossible to tell from the data.
18. The following table shows the net sales at Amazon.com from 2003 to 2010 (*source: Amazon.com quarterly reports*):

Year	2003	2004	2005	2006	2007	2008	2009	2010
Billions of dollars	\$5.26	\$6.92	\$8.49	\$10.72	\$14.84	\$19.15	\$24.51	\$34.21

If the net sales are modeled using an exponential function  $S(t) = a \cdot b^t$ , where  $S$  is the net sales in billions of dollars, and  $t$  is the number of years after 2003, which of the following is an appropriate value for the base,  $b$ ?

- (a) 1.31  
(b) 5.26  
(c) 34.21

(d) 6.5

19. The following table shows the net sales at Amazon.com from 2003 to 2010 (*source: Amazon.com quarterly reports*):

Year	2003	2004	2005	2006	2007	2008	2009	2010
Billions of dollars	\$5.26	\$6.92	\$8.49	\$10.72	\$14.84	\$19.15	\$24.51	\$34.21

If the net sales are modeled using an exponential function  $S(t) = a \cdot b^t$ , where  $S$  is the net sales in billions of dollars, and  $t$  is the number of years after 2003, which of the following is an appropriate value for  $a$ ?

- (a) 34.21  
(b) 1  
(c) 1.31  
(d) 5.26
20. Which is better at the end of one year: An account that pays 8% annual interest compounded quarterly or an account that pays 7.95% interest compounded continuously?
- (a) 8% quarterly  
(b) 7.95% continuously  
(c) They are the same.  
(d) There is no way to tell.
21. Caffeine leaves the body at a continuous rate of 17% per hour. How much caffeine is left in the body 8 hours after drinking a cup of coffee containing 100 mg of caffeine?
- (a) 389.62 mg  
(b) 22.52 mg  
(c) 25.67 mg  
(d) There is no way to tell.
22. Caffeine leaves the body at a continuous rate of 17% per hour. What is the hourly growth factor?
- (a) .156  
(b) .17  
(c) .844  
(d) There is no way to tell.