

TEST #2

NAME:

Pledge: I pledge on my honor that I have neither given nor received any assistance on this exam nor have I used any dishonest means to obtain my results.

Signature: _____

Note: This test is out of 50 points. To receive full credit you must SHOW ALL WORK!

Some Formulae You May find useful:

$$\sin\left(\frac{\pi}{4}\right) = \cos\left(\frac{\pi}{4}\right) = \frac{\sqrt{2}}{2}$$

$$\sin\left(\frac{\pi}{3}\right) = \cos\left(\frac{\pi}{6}\right) = \frac{\sqrt{3}}{2}$$

Question	Score Possible	Score
1	29	
2	6	
3	10	
4	5	

Total Score: _____ / 60

1. Compute the following:

(a) (7 points)

$$\int \frac{x^2}{x^2 + 5x + 4} dx$$

(b) (7 points)

$$\int_1^2 \ln(x)^2 dx$$

(c) (5 points) $\lim_{x \rightarrow \frac{\pi}{2}} (\sec(x) - \tan(x))$

(d) (5 points)

$$\int \frac{\cos(\theta)}{1 + \sin^2(\theta)} d\theta$$

(e) (5 points)

$$\frac{d}{dx} \ln(\tan^{-1}(x)).$$

2. (6 points) For each function in the list below, match it to one of the attached graphs. Justify your choices using full sentences. Note that the constants C and a are unknown positive numbers, but they are the same for all the graphs. Since you don't know what C and a are, your answer should be based on the qualitative shapes of the graphs.

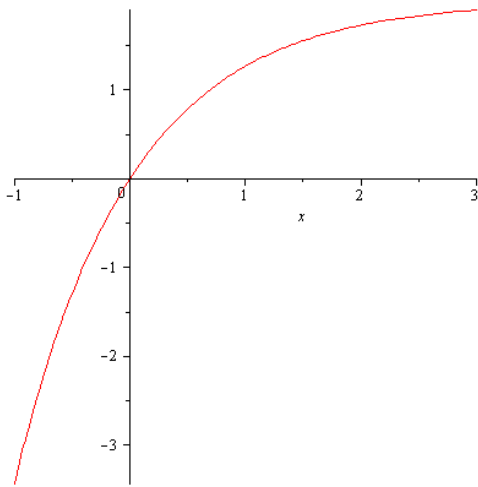
(a) Ce^{ax}

(b) $C(1 - e^{-ax})$

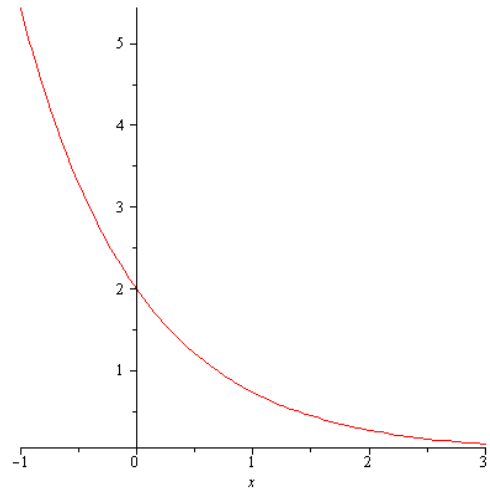
(c) $\frac{C}{1+e^{-ax}}$

(d) Ce^{-ax}

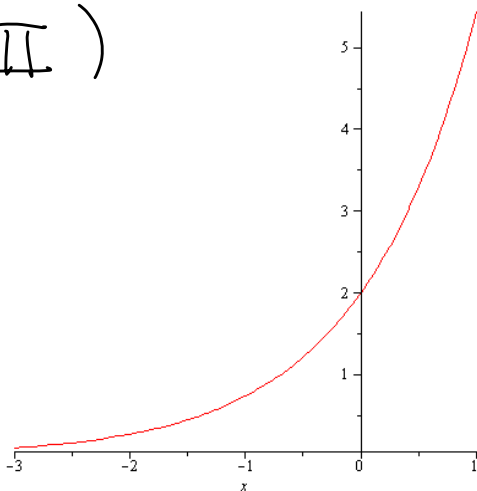
(I)



(II)

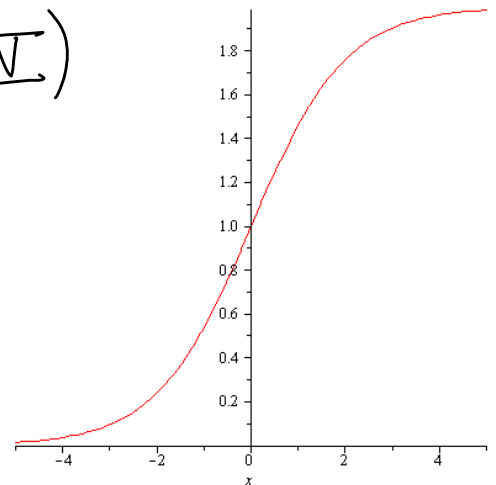


(III)



4

(IV)



3. (10 points) The value of a car declines exponentially after its date of purchase. Suppose you initially purchased a car for \$12,000. After 1 year, it is worth only \$9,000. Find a function which models the value of your car over time, and use that function to find out how long it will take until your car is only worth \$1,000. If you took a 5 year loan out to pay for the car, would it be paid off before your car became worthless? If so, how much would the car be worth when your loan was paid off?

4. (5 points) Find the absolute maximum and minimum of the function

$$f(x) = \log_2(1 + x + x^2)$$

on the interval $[-1, 1]$.