

Problem 1: §1.3 #40

Answers:

$$f \circ g = \sqrt{2x^2 + 5} \quad (0.5)$$

$$g \circ f = 2x + 4 \quad (0.5)$$

$$f \circ f = \sqrt{2\sqrt{2x+3} + 3} \quad (0.5)$$

$$g \circ g = x^4 + 2x^2 + 2 \quad (0.5)$$

$$D = \mathbb{R} \text{ or } (-\infty, \infty) \quad (0.5)$$

$$D = \{x \mid x \geq -3/2\} \text{ or } [-3/2, \infty) \quad (0.5)$$

$$D = \{x \mid x \geq -3/2\} \text{ or } [-3/2, \infty) \quad (0.5)$$

$$D = \mathbb{R} \text{ or } (-\infty, \infty) \quad (0.5)$$

Problem 2: §1.6 #26

Work:

$$y = \frac{1+e^x}{1-e^x}$$

$$y(1-e^x) = 1+e^x$$

$$y - ye^x = 1+e^x$$

$$y-1 = ye^x + e^x$$

$$y-1 = e^x(1+y)$$

$$\text{so } e^x = \frac{y-1}{y+1}$$

$$\text{thus } \ln(e^x) = x = \ln\left(\frac{y-1}{y+1}\right)$$

then interchange  $x$  and  $y$

Answer:

$$f^{-1}(x) = \ln\left(\frac{x-1}{x+1}\right)$$

①

Problem 3: §1.6 #50

Work:

$$a) \ln(\ln x) = 1$$

$$\text{so } e^{\ln(\ln x)} = e^1$$

$$\text{or } \ln x = e$$

$$\text{so } e^{\ln x} = e^e$$

Answers:

$$(a) x = e^e \quad (0.5)$$

$$\approx 15.1543$$

$$b) e^{ax} = Ce^{bx}$$

$$\ln(e^{ax}) = \ln(Ce^{bx})$$

$$ax = \ln C + bx$$

$$ax - bx = \ln C$$

$$(b) x = \frac{\ln C}{a-b} \quad (0.5)$$

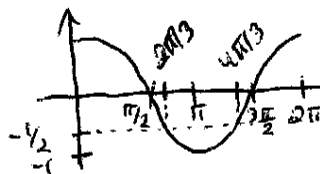
Problem 4: Appendix C #34

Work:

$$2 \cos x + 1 > 0$$

$$2 \cos x > -1$$

$$\cos x > -1/2$$



$$\cos x = -1/2 \text{ if } x = 2\pi/3 \text{ or } 4\pi/3$$

Answer:

$$0 \leq x < 2\pi/3 \text{ and } 4\pi/3 < x \leq 2\pi$$

or

$$[0, 2\pi/3) \cup (4\pi/3, 2\pi]$$

Problem 5: Appendix C #42

Answers: (a)  $\arctan(\sqrt{3}) =$

$$\pi/3$$

(b)  $\arcsin(1) =$

$$\pi/2$$

$$\text{or } 1.5708$$

$$\text{or } 1.0472$$

Problem 6: §2.1 #8

Answers:

(a) (i) on  $[1, 2]$ ,  $v_{avg} = \frac{S(2) - S(1)}{2 - 1} = \frac{3 - (-3)}{1} = 6 \text{ cm/s}$  (0.5)

(ii) on  $[1, 1.1]$ ,  $v_{avg} = \frac{S(1.1) - S(1)}{1.1 - 1} = \frac{-3.4712 + 3}{0.1} = -4.71 \text{ cm/s}$  (0.5)

(iii) on  $[1, 1.01]$ ,  $v_{avg} = \frac{S(1.01) - S(1)}{1.01 - 1} = \frac{-3.0613 + 3}{0.01} = -6.13 \text{ cm/s}$  (0.5)

(iv) on  $[1, 1.001]$ ,  $v_{avg} = \frac{S(1.001) - S(1)}{1.001 - 1} = \frac{-3.006264 + 3}{0.001} = -6.27 \text{ cm/s}$  (0.5)

(b)  $v(1) \approx -6.3 \text{ cm/s}$  (1)