

Sample midterm 1 Solutions

①

Q1 a) $x + \frac{y}{x} - z$ b) $\frac{(\cos^2 x) \cdot \sqrt{x}}{5}$ c) $\frac{x + y(z-x)}{y + x/2}$

Q2 a) $x^y(z)$ b) $x / (1 + y/(z+1))$

c) $\sin(x)^2/8 + 5 \exp(\sqrt{x})/3$

to check, evaluate at simple values of x, y, z .

Q3 $1/3x = \frac{1}{3x}$ to check, evaluate at $x=1$
 $1/3 \times x = \frac{x}{3}$

Q4 a) $\frac{1}{14}$ b) $\frac{2}{7}$ c) error.

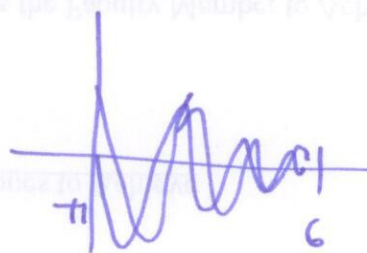
$1/7.0^{-1}(-1)$ check by squaring and taking reciprocal $\rightarrow$ should get 7.

Q5 a) $f(x) = \sin(11\pi x)/\exp(x)$ $g(x) = \cos(11\pi x)/\exp(x)$

$\text{plot}([f, g], \pi, 6)$

b) f has 5 local minima
 g " 4 "

c) f has 5 local max
 g " 5 "



Q6

$$f(x) = \cos(x) + \frac{1}{(x-\pi)^2}$$

$$f(x) = \cos(x) + 1/(x-\pi)^2$$

$$\text{plot}(f, 0, \pi)$$

zoom in 1.86

Q7

$$f(x) = \cos(3x)$$

$$g(x) = -7x + 50$$

$$x \rightarrow f(x) - g(x)$$

$$\text{plot}(f-g, -100, 100)$$

zoom in.

7.61

Q8

$$f(x) = (1 + x^2) / 3$$

$$g(x) = \sin(1/2 x)^2$$

$$f(g(1)).$$

Q9

$$f(x) = -1 \leq x \leq 1 \quad ? \quad 0$$